Wildlife Report
for Management Indicator Species, Species of Concern from the Northwest Forest Plan, and Landbirds

Melvin Butte Vegetation Management Project

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The Deschutes National Forest Land and Resource Management Plan (LRMP) (USDA 1990a) identified a group of wildlife species as management indicator species (MIS). These species were selected because they represent other species with similar habitat requirements. Management indicator species can be used to assess the impacts of management activities for a wide range of wildlife species with similar habitat needs (FSM 2620.5). Those management indicator species selected for the Deschutes National Forest include the bald eagle, northern spotted owl, golden eagle, red-tailed hawk, osprey, northern goshawk, Cooper's hawk, sharp-shinned hawk, great gray owl, great blue heron, woodpeckers (cavity nesters), peregrine falcon, California wolverine, elk, mule deer, American marten, Townsend's big-eared bat, waterfowl, snags and down wood habitat.

In addition to the above mentioned MIS species, there have been a number of wildlife species (species of concern) in which analysis is required either through the Northwest Forest Plan (e.g. bats; pg C-43) or through other directives (e.g., landbirds, see Birds of Conservation Concern section).
Survey and manage species are managed by the Deschutes National Forest Land and Resource Management Plan (LRMP) as amended by the Northwest Forest Plan (NWFP). Management of these species occurs within the range of the northern spotted owl under the Northwest Forest Plan. These species were addressed where they occur under another category (i.e. TES, MIS, BCC etc.). If they did not get addressed in those sections, they were addressed individually and listed as NWFP species.

Introduction to Wildlife Effects

The following report for Management Indicator Species (MIS), Birds of Conservation Concern (BCC), and Big Game have been incorporated in their entirety. The Zone of Influence for discussion on cumulative effects is bounded by the project area for all species except Big Game which is bounded on a subwatershed basis. The area of influence includes overlap with existing conditions such as roads, trails, and past management activities.

This section includes discussion on data used, methods, models, general assumptions, evaluation criteria and a summary of effects. General effects are discussed in this section. General effects cover broad categories of species and those effects that are common to all alternatives including the no action alternative.

Recently completed surveys and historical data were used in determination of species occupancy within the Melvin Butte project area. Incidental species observations have also contributed to the knowledge of species presence within the project area and/or Sisters Ranger District. Potentially suitable habitat is considered to be occupied.

ACE Model (Action/Change/Effect)

The long-term sustainability of forest ecosystems and wildlife habitat is dependent on a variety of factors, but the purpose and need of this project identified that due to fire suppression and existing conditions from past management, stands are over-stocked and outside the Historic Range of Variability (HR). HRV is used to determine the desired future condition for wildlife habitat as it relates to each Plant Association group, and what management action is needed for departure from the existing condition to continue to promote future wildlife habitat. Forest thinning and fuels reduction treatments are the two main treatment types that will occur to move stands toward HRV and have the potential to impact existing wildlife habitat in the short-term. Removal of habitat from these management activities could directly or indirectly affect wildlife species and their habitat. An evaluation of the potential effects to wildlife species will be completed for the project to determine if these effects are negative or beneficial.

Duration and Degree of Impacts (Short-Term vs. Long-Term)

Under each action alternative, the project will primarily manipulate vegetation through a variety of thinning techniques. However, stands may also be treated by use of prescribed fire or a combination of thinning and prescribed fire. In addition, some treatments may not directly impact habitat, but could cause disturbance through equipment operation or smoke from prescribed fire. Effects of these treatments to habitat will be assessed as short-term and long-term impacts. Stand Density Index (SDI) is used to measure the risk of a stand's susceptibility to insect and disease as a result of stand densification. From the initial density reduction treatment, effects from the reduction occur roughly over a 30 year period. After 30 years, stands begin to put on basal area growth, height, and begin to recruit new trees into the stands, increasing SDI (Personal Communication Brian Tandy District Silviculturist). To standardize the length of time when referencing short-term and long-term impacts to wildlife habitat from forest thinning, short-term impacts are $\leq$30 years and long-term impacts are those that will occur over $\geq$30years.

Bounding Spatial and Temporal Changes within the Zone of Influence

For this project proposal, activity area boundaries are considered to be the smallest identified area where the potential direct and indirect effects from different management practices could occur. The project area proposes treatments to ponderosa pine, mixed conifer, and lodgepole pine stands within Northwest Forest Plan Matrix Land Allocation on the Sisters Ranger District. A watershed analysis was completed in 2013 to characterize the human, aquatic riparian, and terrestrial features, conditions, processes and interactions (ecosystem elements) within the watershed. The discussion of wildlife cumulative effects will be focused on the units proposed for treatments and their incremental impacts in combination with past, present and reasonably foreseeable project within the Deep Canyon Watershed ("zone of influence"). Only National Forest system lands will be analyzed within the "zone of influence". Chapter 3 of the EA contains a list of past, present and reasonably foreseeable future projects within the Deep Canyon watershed that has the potential to contribute to cumulative effects. However, not all projects on the list impact wildlife or wildlife habitat. Therefore, Table 1 is a subset of the list from Chapter 3 of ongoing and reasonably foreseeable future actions identified as potentially contributing towards cumulative effects to wildlife in the watershed. Habitat for each identified species associated with the project area will be discussed on a forest wide basis to address species viability as it relates to MIS.

Table 1: Ongoing or Reasonably foreseeable actions in the project area and Deep Canyon 10th field watershed

Type of Action	*General Description*	*Status/Timing*	*Acres*
Vegetation Management			
Pole Creek Fire Timber Salvage	*Salvage of fire killed timber*	*Ongoing*	*54 acres*
Pole Creek Fire Hazard Tree Removal	*Felling and Salvage of fire killed danger trees*	*Ongoing*	*350 acres*
Ursus BFR	*Thinning and mastication*	*Reasonably foreseeable*	*5,900 acres*
Bear Wallow Firewood BFR	*Fire wood cutting along the FS Road 4601*	*Ongoing*	*11 miles of road approximately 510 acres*
Bend Municipal Watershed Fuels Reduction BFR	*Hazardous fuels reduction; thinning*	*Reasonably foreseeable*	*12 miles of road approximately 400 acres*
Skyline Forest, BFR	*Salvage of fire killed timber*	*Reasonably foreseeable*	*Approximately 250 acres.*

Management Indicator Species (MIS) Analysis

A Forest wide assessment for each Management Indicator Species (MIS) identified in the Deschutes National Forest Land and Resource Management Plan (LRMP) was completed in 2012 for the entire Deschutes National Forest (NF) (USFS 2012). For this document, where USFS (2012) is cited, those individual citations associated with the analysis can be found in those documents (USFS 2012). Suitable habitat for each species was defined as habitat that could potentially be utilized for reproduction. An exception to this is associated with species specific standards and guidelines within the Deschutes LRMP, not associated with reproductive habitat, although essential to the viability of that species population within its range. An example of this exception is hiding cover standards and guidelines for mule deer summer range. An assessment was completed for each species based on the amount of potentially suitable habitat that occurs across the Deschutes NF, associated threats, and population trend data where it was available. The assessment used the best available science and guidance such as research found in books, scientific journals, and scientific websites. NatureServe, an international non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action was a major contributor to population trend data. NatureServe and its network of natural heritage programs, including the Oregon State Heritage Program, are the leading source for information about rare and endangered species and threatened ecosystems. Their website, http://www.natureserve.org/, compiles historic and current information from The Nature Conservancy and other conservation groups, U.S. government agencies, private sector partnerships, international agencies, and data cooperators. In addition, for those MIS species which are also hunted or are furbearing species (e.g. big game, waterfowl, and American marten), Oregon Department of Fish and Wildlife provided population trend data for big game, data relative to trapping for marten, and monitoring data for waterfowl. Habitat definitions were developed and modeled for each MIS species. Information from the species assessments formed the baseline for species habitat across the Deschutes National Forest. The Melvin Butte project analysis tiered to those assessments.

Modeling Methodology

Habitat for the various wildlife species was determined using district occurrence data, habitat descriptions found in scientific literature, various data sets, and professional experience. The Viable Ecosystem Model (Viable) was used to determine the live tree component of habitat and formed the basis of acres of existing nesting/denning habitat (Viable Ecosystems Management Guide 1994). For selected species, such as the black-backed woodpecker and American marten, the snag components of habitat were determined using a variety of sources including gradient nearest neighbor (GNN) data and DecAID, as well as Viable. Because of Forest Plan standards for cover and thermal cover requiring trees per acre and height, deer and elk habitat was determined using GNN data.

Viable Ecosystems Model

The Ochoco and Deschutes Viable Ecosystems Management Guide (VEMG) was developed to classify vegetation on a landscape basis. The Viable Ecosystem model provides a process to apply ecosystem management concepts to project level planning. This system compares existing vegetation with site potential. The model focuses on relationships between combinations of vegetation structure and species composition, and habitat requirements for animals, insects, and plants. Viable Ecosystems is a useful tool for cumulative effects analysis of broad scale changes in vegetation at a subwatershed to Forest-wide scale and subsequent changes in animal, insect, or plant communities.

Viable stratifies the environment along a gradient of size, structure, species composition, and relative tree density. The various classifications are then linked to wildlife habitat requirements. For example, a classification with a value of 5615**2** is white fir (56), early seral (1), medium/large structure (5), and **low density (2)** and would typically have a single story (low density) dominated by ponderosa pine (early seral in white fir) 21" diameter or greater (medium/large structure). This provides nesting habitat for white-headed woodpeckers. A value of 5635**1** would equate to white fir (56), late seral (3), medium/large structure (5), and **high density (1)** and would be a multi-storied stand dominated by white fir 21" diameter or greater and provide nesting habitat for pileated woodpeckers. All values that provide habitat for species were used. In addition to the mixed conifer value of 56152 using the white-headed woodpecker example, any seral stage dominated by ponderosa pine, medium/large structure, and low density would provide similar open ponderosa pine habitat and was used in determining amounts of white-headed woodpecker nesting habitat across the Deschutes National Forest.

The 2002 satellite imagery layer was used to develop the vegetation layer to run in the Viable Ecosystem Model. Data is mapped on a 30 meter pixel grid, meaning the map is divided up on a 30 meter grid and that every 30 meter square (pixel) is assigned a value (i.e. 56351) that relates to a stratum of size, structure, tree species composition, and relative tree density. Criteria used (vegetation, seral state, structure, and density) to determine habitat for each species is described in the existing condition of each species. Existing conditions include past actions such as timber sales which used the Forest "FACTS" database. Presenting information in this way and including those current and foreseeable future actions in cumulative effects is the most informative for the decision maker.

GIS Analysis and ArcMap

A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. The information can be related to visual data (maps), tabular data (tables, spreadsheets, or data bases), and used to run models (create new data set from existing data based on criteria or specific conditions). ArcMap is a component of the ArcGIS program. The client software developed by Economic and Social Research Institute (ESRI) was used for the processing and presentation of GIS data.

Gradient Nearest Neighbor (GNN)

GNN maps consist of 30 meter pixel (grid) maps with associated data (tree size, density, snag density, canopy cover, percent down wood cover, etc.). The maps used for this analysis were developed by the Landscape Ecology, Modeling, Mapping, and Analysis (LEMMA) team as part of the GNNPAC Pacific States Forest Vegetation Mapping project. This project involves developing detailed maps of existing forest vegetation across all land ownerships in the Pacific Coast States (Oregon, Washington, and parts of California). It is being conducted by the LEMMA team (Pacific Northwest Research Station (PNW) and Oregon State University) at the Corvallis Lab, in close collaboration with the Western Wildlands Environmental Threats Assessment Center, the Interagency Mapping and Assessment Project (IMAP), Northwest Forest Plan Effectiveness Monitoring, the Remote Sensing Applications Center, and Forest Inventory and Analysis at the PNW Research Station.

The process to create the maps involves using gradient imputation (Gradient Nearest Neighbor, or GNN). GNN uses many variables on a gradient along with satellite imagery to assign data from known field plots to pixels with no data that have the same satellite imagery signature (i.e. it "looks" the same to the computer). The species-size GNN model was used in the Melvin Butte analysis. This model uses species composition and stand structure as components for developing maps. Accuracy of the modeling depends on how "like" pixels match up based on numerous variables. Generally speaking, forest types that had more samples like white-fir were more accurate than those with fewer samples like mountain mahogany (Ohman et al. 2008). Information on GNN accuracy, the LEMMA group, IMAP and the GNNPac project is available at the project website: http://www.fsl.orst.edu/lemma/gnnpac.

DecAID

DecAID is a web-based dataset; it is not a model. It is a synthesis of all the best available research on dead wood. DecAID does not provide information on all life needs of a given species. It integrates current research/studies on wildlife use of dead wood (snags, down wood, dead portions of live trees) in various habitat types. From this, tolerance levels are generated.

Tolerance level (t.l.) is the percent of the studied population that would use a density of snags or down wood. For example, the following table shows the tolerance levels for white-headed woodpeckers. For a population of 100 individual white-headed woodpeckers, at the 50 percent tolerance level, 50 of them would use habitat with at least 1.7 snags per acre greater than or equal to10 inches in diameter. Basically, the higher the tolerance level, the more assurance that habitat is being provided to meet the needs of more individuals in the population (Mellen et al. 2006).

Tolerance intervals (t.i.) were used to determine habitat levels in the planning area. A tolerance interval includes the range of snag density between tolerance levels. Using the example below, the 30-50 percent tolerance interval would be habitat with more than 0.3 snags per acre and less than or equal to 1.7 snags per acre. The 0-30 percent category is included (where 0 values are actually greater than 0) as it provides habitat for a few individuals. A zero category is included in the analysis showing what acreage does not provide habitat.

Table 2: Example of Tolerance Levels and Intervals developed from DecAID Information

Habitat type and Table used from DecAID: Table PPDF_S/L.sp-22; Species: White-headed Woodpecker									
Minimum DBH	**10"**					**20"**			
Tolerance Level		30%	50%	80%			30%	50%	80%
Snag Density (#/acre)		0.3	1.7	3.7			0.5	1.8	3.8
Tolerance Interval	0-30%	30-50%	50 - 80%	80% +		0-30%	30-50%	50 - 80%	80% +
Snag Density (#/acre)	0-0.3	0.3 - 1.7	1.7-3.7	3.7+		0-0.5	0.5-1.8	1.8-3.8	3.8+

Often times, DecAID only has one study available to base its tolerance levels on. While applying findings from a single research site to another area is not always wholly applicable, DecAID provides the best available science to determine effects to a species at this time. Used as a comparison for effects across all alternatives, it can be a useful tool. Tolerance levels do not equate to population potential, nor imply viability, but they are assumed to indicate habitat at varying snag densities.

More information on DecAID can be found on the website at:
www.fs.fed.us/wildecology/decaid/decaid_background/decaid_home.htm

Deer and Elk Habitat

The Deschutes Forest Plan defines suitable deer hiding cover as one of the following:

a) six acre or larger stand capable of hiding 90 percent of a standing adult deer from view of a human at a distance of 200 feet, or

b) six acre or larger stand with an average height of six feet and which has not been thinned in 15 years, or

c) residual clumps of one half acre or larger stands within units with advanced regeneration (trees including small trees up to seven inches in diameter) and at least 12 greater than seven inch trees per acre remaining after harvest (LRMP, WL-54, p. 4-58). Residual clumps less than six acres in size were not modeled which likely under-represents the amount of hiding cover present in the subwatershed analysis.

Suitable elk hiding cover is similar**:**

a) six acres or larger stand capable of hiding 90 percent of a standing adult elk from view of a human at a distance of 200 feet, or

b) six acre or larger stand with an average height of 10 feet and which has not been thinned in 20 years, or residual clumps of two acres, or

c) larger stands within units with advanced regeneration (trees including whips up to seven inches in diameter) and at least 12 greater than seven inch trees per acre remaining after harvest (LRMP, WL-47, p.4-57).

To be conservative, hiding cover for both deer and elk was modeled using Gradient Nearest Neighbor (GNN) with the criteria of hiding 90 percent of a standing adult elk from view of a human at a distance of 200 feet. This condition was modeled using trees with a density of at least 469 trees/hectare (190 trees/acre or a tree every 15 ft) with a diameter of 3-25 cm (1-10 in dbh) and at least two meters (7 ft) tall across the Melvin Butte planning area. Fields containing this data in GNN and the definitions from the data dictionary include:

- TPH_3_25 – Density of live trees 2.5-25 cm dbh in trees/hectare.
- STNDHGT – Stand height, computed as average of heights of all dominant and codominant trees in meters.

Similarly thermal cover for both deer and elk was modeled using the GNN. The criteria used to model thermal cover were an average stand height of 30 feet and the stands must contain 40% crown cover.

LEMMA Data Dictionary: http://www.fsl.orst.edu/lemma/common/dataDictionary.php

An important finding from the Starkey Experimental Forest and Range studies is that road (or route) density is not the best predictor of habitat effectiveness for elk. Instead, a model based on distance bands proved to be a more spatially explicit and biologically meaningful tool for assessing effects from roads. Road densities do not provide a spatial depiction of how roads are distributed on the landscape (Rowland 2005). Hillis et al. (1991) defined elk security habitat for forested stands greater than 250 acres in size and greater than ½ mile from an open route. Rowland et al. (2000) determined that the distance of 1,969 yards (1,800 meters) is equivalent to that at which elk response to open roads diminished markedly. Therefore, acreage greater than one mile from an open motorized route is assumed to provide greater security habitat for elk than the ½ mile distance.

Key Issues/Analysis Issues and Comparison Measures

Key Issues identified from public scoping, or Analysis Issues identified from Forest Plan Standards and Guidelines (as Amended) or the latest science and guidance, were developed to illustrate the effects to wildlife and how those effects differ by alternative. In this analysis, commercial thinning and fuels treatments are the major impacts to habitat quality, quantity and species life needs. Using the same units of measure allows the major impacts to be easily understood and compared, providing the Decision Maker the necessary data to make an informed decision.

Units of Measure

Suitable habitat for each MIS species analyzed in this document has been quantified for the project area, the watershed, and at the Forest level. The following measure will be used to evaluate the impacts and associated effects of the planned activities:

- Acres of potentially suitable habitat were calculated by GNN located within the Melvin Butte area and associated watershed (Deep Canyon Watershed) to complete a cumulative effects analysis.
- Potentially suitable habitat was calculated using GNN and Viable at the Forest level to compare project cumulative effects to the watershed with the overall habitat on the forest, to determine effects to habitat viability across the Forest.

Executive Summary

Summary of Effects/Impacts for MIS, SOC, (landbirds and NWFP/S&M)

Alternatives 2 and 3 are consistent with the standards and guidelines in the Deschutes National Forest Land and Resource Management Plan as amended by the Northwest Forest Plan for the following Management Indicator Species: Townsend's big-eared bat, White-headed woodpecker, and Lewis' woodpecker.

Alternatives 2 and 3 consistent with the Biological Objectives in the Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington for the white-headed woodpecker, Lewis' woodpecker, black-backed woodpecker.

A Wildlife Report analyzes the impacts to management indicator species (MIS) and species of concern (landbirds and/or NWFP S&M species) associated with Melvin Butte project on the Deschutes National Forest.

Thirteen management indicator species on the Deschutes National Forest and/or their habitats are known or suspected to occur within the project area. In addition, 11 landbirds on the Deschutes National Forest and/or their habitats are known or suspected to occur within the project area. The following is a summary of the findings of the Wildlife Report on the impacts of the proposed alternatives.

1. Implementation of Alternatives 2 and 3 is associated with reproductive habitat for 13 management indicator species (MIS) on the Deschutes National Forest but will not contribute to a change in viability for these species.

2. Implementation of Alternatives 2 and 3 is associated with the habitat of 11 landbird species on the Deschutes National Forest, although treatments will reduce and or modify habitat, they will not preclude use of the project area by the identified landbirds.

3. Implementation of the Melvin Butte project is consistent with the Standards and Guidelines for the Deschutes Land and Resource Management Plans for MIS.

4. Implementation of Melvin Butte project is consistent with the biological objectives outlined in the Conservation Strategies for Landbirds of the East-slope Cascades. Treatments were designed to be beneficial to these species by providing long-term habitat.

Management Indicator Species

The Deschutes National Forest Land and Resource Management Plan (LRMP) (USDA 1990) identified a group of wildlife species as management indicator species (MIS). These species were selected because they represent other species with similar habitat requirements. Management indicator species can be used to assess the effects of management activities for a wide range of wildlife species with similar habitat needs (FSM 2620.5). Those species selected for the Deschutes National Forest include the bald eagle, northern spotted owl, golden eagle, red-tailed hawk, osprey, northern goshawk, Cooper's hawk, sharp-shinned hawk, great gray owl, great blue heron, woodpeckers (cavity nesters), peregrine falcon, California wolverine, elk, mule deer, American marten, Townsend's big-eared bat, and waterfowl. In addition, habitats and wildlife species identified in the Northwest Forest Plan are addressed.

Some of the MIS species have been discussed in the Threatened, Endangered, or Sensitive (TES) Species report. Effects of the project to TES species can be located in the Melvin Butte Wildlife Biological Evaluation (BE). Species discussed in the BE that are also MIS are the northern bald eagle, northern spotted owl, peregrine falcon, Lewis' woodpecker, white-headed woodpecker and California wolverine. The list of MIS species addressed in this report are located in Table 3 and Appendix 1. MIS species that are also Northwest Forest Plan species with specific management recommendations are: black-backed woodpeckers, white-headed woodpeckers, pygmy nuthatches, flammulated owls, and Townsend's big-eared bats.

Table 3. Management Indicator Species Summary.

Species	**Habitat**	**Presence**
Birds		
Coopers Hawk (*Accipiter cooperi*)	Mature forests with high canopy closure/tree density	Potential habitat but no known nesting
Sharp-shinned Hawk (*Accipiter striatus*)	High canopy closure and large trees in addition to young, dense, even-aged stands	Potential habitat but no known nesting
Northern Goshawk (*Accipiter gentiles*)	Mature and old-growth forests; especially high canopy closure and large trees	Known presence and known nesting
Great Blue Heron (*Ardea herodias*)	Riparian edge habitats including lakes, streams, marshes and estuaries	No habitat
Great Gray Owl (*Strix nebulosa*)	Mature and old growth forests associated with openings and meadows	No habitat
Golden Eagle (*Aquila chrysaetos*)	Open ponderosa pine or mixed conifer	No habitat
Osprey (*Pandion haliaetus*)	Large snags associated with fish bearing water bodies	No habitat
Red-tailed Hawk (*Buteo jamaicensis*)	Large snags, open country interspersed with forests	Known presence but no known nesting
Waterfowl (See appendix A for species)	Lakes, ponds, streams	No habitat
Woodpeckers (See appendix A for species)	***These species will be discussed in the Snag and Down Wood Section.***	Known presence
Mammals		
American Marten (*Martes americana*)	***This species will be discussed in the Snag and Down Wood Section.***	Potential habitat but no known presence
Elk	Mixed habitats	Known presence

(*Cervus elephas*)		
Mule Deer (*Odocoileus hemionus*)	Mixed habitats	Known presence
Townsend's big-eared Bat (*Corynorhinus townsendii*)	Mines, Caves, or Buildings	No habitat
Habitats		
Snags, Down Wood and Log Associated Species	Dead Wood Habitat	Associated with cavity nesters and marten
Special or Unique Habitat Associated Species	Springs, Seeps, cliffs, and talus slopes	Known presence

Appendix 2 identifies species documented on USFS administered lands within the Melvin Butte project area.

Those MIS species containing no habitat will not receive further analysis in this document. The Townsend's big-eared bat is analyzed with TES species.

Other Species Analyzed

In addition to MIS species, impacts need to be assessed for a number of wildlife species deemed as "species of concern" and habitats of concern either through the Northwest Forest Plan or through other directives (example Birds of Conservation Concern and the Landbird Strategic Plan). These habitats and species are listed in Table 4:

Table 4: Other Species Analyzed Summary

Species	**Habitat**	**Presence**
Birds		
Birds of Conservation Concern-Landbird Strategy See Appendix 2 and 3	Various Habitats	Known Presence
Mammals		
Roost Sites for Bats	Caves, Mines, Wooden Bridges, Buildings	Known Presence

Birds - MIS

Northern Goshawk

Existing Condition

Source habitats for goshawk are old forest and unmanaged young forests in montane, lower montane, and riparian woodland communities. Important habitat attributes of goshawk prey species include snags, down logs, woody debris, large trees, openings, herbaceous and shrubby understories and an intermixture of various forest structural stages (Wisdom et al. 2000). During winter some goshawks may travel short distances to lower elevations and more open habitats in all upland woodland types (Wisdom et al. 2000) (USFS 2012).

From Wisdom et al. 2000 – "Goshawks nest in various forest structural conditions …nest stands are generally characterized by large trees and the densest canopy cover available within the area (Reynolds et al. 1992) but are occasionally located in small-diameter trees (Hayward and Escano 1989, Squires and Ruggiero 1996)." Foraging occurs in various cover types and structural stages, and the juxtaposition of several habitats may enhance the quality of foraging habitat around nest sites (Hargis et al. 1994) (USFS 2012).

In general, goshawk nest areas are unique in structure, with large trees, dense canopies, and high canopy closure. Goshawk nesting habitat in eastern Washington and Oregon is generally composed of mature and older forests (McGrath et al. 2003). Nest stands are typically composed of a relatively high number of large trees, high canopy closure (>50%), multiple canopy layers, and a relatively high number of snags and downed wood (Finn 1994, McGrath et al. 2003) (USFS 2012).

The data from the BBS (Breeding Bird Survey) for the state of Oregon and the Great Basin Bird Conservation Region (BCR 9), due to the low detectability of this species using BBS methods, the relative abundance is low. The population trend for the BCR is "Possible to moderate population decrease". Partners in Flight (PIF) provides a population estimate database which provides estimates at a continental scale (including global or range-wide population estimates for North American species), population estimates for Bird Conservation Regions (or State portions), estimates for individual states and provinces, and estimates where BCRs overlap with states and provinces (Blancher et al. 2007). The Oregon portion of BCR 9 has only about 0.1% of the total global population and only 14% of the total BCR 9 population of northern goshawks. The detection rate is low (.0.01) for the BBC routes. However, the routes are generally along roads and simply record species observed. As noted earlier, goshawks are difficult to detect and prefer closed canopy forest where they are difficult to observe (USFS 2012).

The following is a potential list of threats due to habitat alteration (USFS 2012):

- Timber harvest is the principal threat to breeding goshawk populations (Squires and Reynolds 1997) due to their reliance on mature and old-growth timber, especially for nesting, although not exclusively (Marshall et al. 2006).
- Fire suppression may lead to increased susceptibility of stand-replacing fire and insect and disease outbreaks, which can result in the deterioration or loss of nesting habitat (Graham et al. 1999 as cited in NatureServe 2011, Wisdom et al. 2000).
- Loss of foraging habitat due to dense conifer understory as a result of fire suppression. Dense understories may obstruct flight corridors used by goshawks to hunt prey (Wisdom et al. 2000).
- Predation on goshawk by other raptors including Red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), and long-eared owl (*Asio otus*) which invade habitat following canopy reduction by logging (Crocker-Bedford 1990).

- ❖ Falconry - Goshawks can legally be taken for falconry in various states, including Oregon. Take by falconers is considered low; therefore it is thought to be a negligible threat.

In addition to habitat alteration, threats from disturbance due to logging activities conducted near nests during the incubation and nestling periods can cause nest failure due to abandonment (NatureServe 2011, Squires and Reynolds 1997). Also, high road densities may result in loss of snag and down wood habitat important to goshawk prey (Wisdom et al. 2000) (USFS 2012).

The NatureServe status for the pygmy nuthatch is secure at the global level (G5), apparently secure at the national level for both the breeding and non-breeding ranges (N4B, N4N), and apparently vulnerable at the state level (S3).

Surveys were complete using the Northern Goshawk Inventory and Monitoring Technical Guide (USDA 2006) within the Melvin Butte project area in 2009-2014. One active nest was located as a result of the surveys. Two historic nest sites occur within the project area and were active between 1998 and 2005 (NRIS Wildlife Database). One active goshawk nest site is documented within the project area. A 30+ acre nest core was identified around the nest tree that will be excluded from treatment. A 400 acres of post fledging area was also identified adjacent to the nest core

Through the Forest wide assessment completed for MIS, goshawk reproductive habitat was mapped across the entire Deschutes National Forest. Approximately 3,347 acres habitat occurs within the Melvin Butte project area, 5,346 acres within the Deep Canyon watershed, and 446,557 acres of habitat occurs across the Deschutes National Forest. The following Table 5 summarizes these acreages:

Table 5: Northern Goshawk Habitat within the Melvin Butte Project Area, Deep Canyon Watershed, and across the Deschutes National Forest.

Acres of Northern Goshawk Habitat in the Melvin Butte Project Area	Acres of Northern Goshawk Habitat in the Deep Canyon Watershed	Acres of Northern Goshawk Habitat Across the Deschutes National Forest
3,347 acres	5,346 acres	446,557 acres

For the detailed assessment on the Northern Goshawk for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measure: Acres of reproductive habitat affected.

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

Areas that currently provide suitable goshawk habitat would most likely have increased mortality due to tree stress. Continued high stand densities will reduce the longevity of residual large trees structure that occurs in these stands. In the long-term, available nest trees will be limited and the future development of larger nesting trees will be prolonged. In stands of second growth ponderosa pine, short-term affects from high stand densities reduces the resiliency of these stands against bark beetle attack. The long-term affects from beetle outbreaks include high densities of small snags within project area, and as a result lack the recruitment of large tree structure over time. Lack of large tree structure within the project area and watershed has been identified as limiting through the historic range of variability analysis (HRV).

Due to stand densities within the project area and increases in mortality overtime, the risk of large scale stand replacing fire across the Melvin Butte project area also increases over time, potentially impacting high density stands that provide goshawk habitat reproductive habitat.

Stand resilience to insects and disease is measured by the Upper Management Zone (UMZ). The UMZ relates to the density of trees (basal area, trees per acre, etc.) a forest stand can support without significant mortality from bark beetles. The upper management zone is the density level at which trees begin to come under significant stress and can become susceptible to bark beetles and other insects and diseases. Stands above UMZ that are susceptible or show sign of insect and disease are typically high density, and therefore also typically at risk wildfire. Forest stands managed below the upper management zone are more resilient and less susceptible to wildfire. There are approximately 4,456 acres that have the potential to receive vegetation treatment. Under the existing condition 92% of these stands are above the Upper Management Zone and are at risk or currently be impact by insects and disease due to high stand densities.

High intensity crown fire has been a major cause of habitat reduction to the northern goshawk across the Sisters Ranger over the last 10 years.

Overall, high stand densities will result in a decrease in tree vigor among all size classes. The most significant effect of high stand densities will be the gradual loss of the existing large-tree component/nesting habitat which is likely to be at a much higher rate than if stand densities were reduced to more healthy levels.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Mixed Conifer with Group Opening(MCGO), Mixed Conifer without Group Opening

These three treatment types all thin from below, but occur within different seral classes, plant associations and geographical locations within the project area. Treatments associated with HTH are commercial thinning from below and occur in ponderosa pine and mixed conifer stands. These stands contain mature or over-mature overstories with advanced stages of regeneration in the understory. HTH treatments will thin from below removing trees 8 inches dbh and larger.

MCGO and MC no group openings treatments are also commercial thinning from belowing; removing trees 7 inches dbh and larger in the understory of mature ponderosa pine. Thinning will focus on removing white-fir and lodgepole pine understories and reducing the risk of crown fire potential. Within MCGO treatments, where the overstory is dominated by white-fir and lodgepole pine, small group opening will be created less than 3 acres in size and planted to ponderosa pine. This treatment will promote the development of future fire resistant stands. Group openings could be created in up to 30% of a given stand.

Thinning in suitable goshawk habitat would occur in both second growth ponderosa pine and multi-storied ponderosa pine and mixed conifer stands containing residual large trees. Thinning from below in HTH treatments will favor the largest ponderosa pine in pure pine stands. In MCGO and MC no group openings , thinning will favor ponderosa pine and healthy white-fir. A target basal area of 60 square feet is the objective, but will vary across these stands. Different scenarios exist depending on the existing basal area, site productivity, and stand structure objectives as well as differing slightly by alternative. This treatment aids in maintaining large trees by reducing their susceptibility to fire and insects by removing competition for space and nutrients. Thinning decreases stand densities and allows for faster growth of young trees while reducing risk (removal of ladder fuels). However, canopy cover is reduced overall resulting in more open stands. Negative impacts may result from the MCGO treatments, due to overstory fragmentation associated with creating small group openings from the removal of all lodgepole pine and white-fir. However, due to the edge associated with the openings and the herbaceous material that it will promote, rodent and ground nesting bird habitat will increase in these areas, potentially increasing a more diverse variety of foraging opportunites for the goshawk. In addition, beneficial

impacts should result from reducing risk to existing suitable habitat and facilitating the development of future habitat by planting group opening back to ponderosa pine.

Mowing and Burning Only (B)

Underburning will occur in stands with a more fire resistant overstory and fewer small (<9" dbh) trees than in small tree thinning units. Some thinning of small trees (up to 8" dbh) may be needed as a pre-treatment to fire. Mowing of brush may also occur where existing brush density and height would contribute to undesirable fire behavior. This treatment aids in maintaining the overstory by reducing the susceptibility to wildfire and will favor longer-lived, more fire resistant species like ponderosa pine. Beneficial impacts should result in more stable habitat over the long term. Negative impacts may result in the potential degradation of prey species habitat with the consumption/loss of some softer snags, down woody material, and brush. However, this will be minimal due to the lower intensity burn versus that of a wildfire.

Lodgpole Pine Improvement (LPI)

These treatments are primarily focused on the removal of lodgepole pine, however some white-fir exists and could potentially be removed as well. These treatments will remove trees that have fading crowns and the trees are succumbing to beetle attacks or disease or both. The treatment will retain all trees with healthy crowns and the future stand will depend on the understory regeneration. Goshawk reproductive habitat is not wide spread in this area and habitat occurs in small patches. Treatment will remove habitat but will reduce the stand densities and the risk of beetle attack to the understory. Treatment will accelerate the development of even aged logepole pine which cycles in this area every 100 years, and although goshawk tend to prefer mixed conifer and ponderosa pine plant association groups for nesting, within the 100 year cycle some areas could potentially provide some small inclusions of nesting habitat in the long-term.

Table 6 summarizes the amount of goshawk reproductive habitat affected by the action alternatives identified for the Melvin Butte project.

Table 6: Total Acres of Goshawk Reproductive Habitat Associated with Each Treatment Type by Alternative for the Melvin Butte Project.

Treatment Type	Alternative 2	Alternative 3
B	492	492
HTH	802	907
MC – No Group Opening	-	442
LPI	135	135
MCGO	453	-
Total Acres.	**1,882**	**1,976**

Affects to goshawk habitat are similar under Alternatives 2 and 3. The outcome of the effects to habitat as a result of each treatment type is similar across both action alternatives; the only thing that changes by alternative is the total acres of habitat treated. In addition, treatments would also need to meet the purpose and need of reducing insects, disease, and the risk of stand replacing wildfire.

Overall, approximately 1,882 acres of goshawk reproductive habitat are associated with treatments identified under Alternative 2 and approximately 1,976 acres under Alternative 3.

Loss of the large tree component would be slowed on treated acres as trees respond to the increased growing space resulting from thinning from below.

Overall within the LOS stands, overstory structural diversity will remain, but understory complexity will be reduced through thinning, mowing, and burning. Although prey habitat will be reduced in the short-term, residual habitat will remain providing foraging opportunities for the goshawk. Long-term benefits

of treatments will be a reduction in stress to the overstory promoting longevity, but also to promote the development of future old growth in the stands that will provide long-term nesting habitat.

There are approximately 4,456 acres that have the potential to receive vegetation treatments. As a result of both action alternatives, 90% of these stands will be below the Upper Management Zone. Treatment will greatly increase stand resiliency to insects, disease, and wildfire through stand density reductions.

Alternative 2 and Alternative 3 - Cumulative Impacts

Activities identified in Table 1 were reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to northern goshawks. The Deep Canyon 5th field watershed is being used as the scale for analysis for the northern goshawk. Based on that review, the potential cumulative impacts are those discussed below.

The majority of nest sites on the Sisters RD are located within the mixed conifer PAGs (14 of 19). These PAGs experienced moderate to heavy mortality from insect and disease occurring in the early 1990's and the subsequent loss of canopy cover. This event probably had the greatest influence on goshawk habitat across the district due to the reduction of canopy cover prior to the fires. These open stands are considered unsuitable nesting habitat for goshawks.

Three large wildfires have occurred within the Deep Canyon Watershed –Rooster Rock (2010), Pole Creek (2012), and Two Bulls (2014). These fires also impacted suitable reproductive habitat. Not every acre of the fires equated to unsuitable habitat for the goshawk but all this habitat is now considered unsuitable for nesting due to the fires intensity.

Approximately 54 acres of ongoing fire salvage is associated with the Pole Creek Fire. Reasonably foreseeable fire salvage is also proposed for the Two Bulls fire totaling approximately 250 acres. These fire salvages do not and will not remove goshawk reproductive habitat.

Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Fire Wood are primarily associated with montane mixed conifer habitat and lodgepole pine totaling approximately 7,060 acres. These projects are not likely associated with goshawk habitat and primarily propose the removal of beetle killed lodgepole pine, therefore will not likely contribute to cumulative effects.

The Three Creeks personal use firewood cutting area also occurs in the watersheds. This area occurs in both mixed conifer and lodgepole pine habitat types. Firewood cutting is not wide spread and primarily occurs where dead trees can be accessed from open roads. Although snags are cut and removed, removal occurs on an individual tree basis versus across the entire designated area. The area is approximately 3,029 acres. The majority of firewood removed is associated with beetle killed lodgepole pine and impacts to the goshawk would be incidental from firewood gathering.

Private lands are not managed for goshawk habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term.

Although treatments will enhance long-term habitat and will retain habitat connectivity throughout the project area, treatments are proposed within 35% of the total goshawk habitat within the Deep Canyon watershed. With the ongoing forest management projects within the Deep Canyon watershed there will be less than a 1% reduction in the overall habitat for the goshawk across the Deschutes National Forest.

Conclusion

Cumulatively, this project impacts less than 1% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance).

The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of the goshawk is expected on the Deschutes National Forest.

Consistency with the Deschutes LRMP

Wildlife standards and guidelines WL-6, WL-10, and WL-11 will be assessed. The project is consistent with the Deschutes LRMP.

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-6 – Nesting habitat for at least 40 goshawk pairs will be provided in mixed conifer, mtn. hemlock, and ponderosa pine forests outside wilderness.	Meets	Habitat is available across the Forest.
WL-10 – Locating new roads within nest site stands will be avoided.	Not Applicable	No new road construction is proposed for this project.
WL-11 – Nests will be protected within ¼ mile from disturbing activities.	Meets	Mitigation measures are in place for seasonal restriction around known nest sites and in the event a new nest site is found.

Mitigation Measures

1. Disruptive work activities will not take place within ¼ mile of newly discovered nest sites from March 1 through August 31.
2. If a newly discovered nest site is identified during implementation a 30 acre no treatment area around the nest site will be identified and a 400 acre post fledging area associated with the nest core will be mapped.

Recommendations

None

Cooper's and Sharp-shinned Hawks

Existing Condition

Cooper's Hawk

The Cooper's and sharp-shinned hawks are considered MIS species in the Deschutes LRMP. They often use dense cover in which to hunt and nest. In Oregon, Reynolds and Wight (1978) studied Cooper's hawk distribution, nest density, and productivity in 3 subregions: 1) the Coast Range and the west slope of the Cascade Range, a moist, densely forested region with a mild maritime climate referred to as western Oregon; 2) southwestern Oregon, which includes the Siskiyou Mountains, characterized by relatively warm, wet winters and hot, dry summers; and 3) eastern Oregon (including the east slope of the Cascade range), a high elevation and more dry region with affinities to the Rocky Mountain forests. The tree species composition in the Bly study area (eastern Oregon) varied from pure stands of ponderosa pine

at lower elevations, to mixed stands of ponderosa pine and white fir at mid-elevations, to mixed and pure stands of white fir and lodgepole pine at high elevations. Stands of all age classes in each timber type were represented, however the most common type was mature ponderosa pine overstory with mixed understory of ponderosa pine and white fir. As part of Reynolds and Wight's study from 1978, Reynolds et al. (1982) further studied Cooper's hawk habitat within the same geographic reference: Coast Range and eastern Oregon, including the west and east slopes of the Cascades, and the Wallowa, Blue, Ochoco, Bly, and Steen's mountains in eastern Oregon. Vegetational and physiographic characteristics of nest sites were obtained and the analysis concluded that this species nests in stands that resembled the even-aged, 2nd-growth stands in larger older trees (30-60 years old in the northwestern region and 50-70 years old in eastern Oregon), and have deep crowns. In northwestern Oregon, all nests except one (ponderosa pine) were in Douglas-fir stands, whereas in eastern Oregon ten nests were in ponderosa pine stands, five were in white fir stands, and three were in Douglas-fir stands. Also, Cooper's hawk nests in both regions were on horizontal limbs against the trunk (a few were out on limbs or in crotches of double trunks) and were either immediately below the nest-tree crown or in the lower portion of the crown. Nests in eastern Oregon were commonly in deformed trees infected by dwarf mistletoe and that had heavy foliage, witches brooms, or double trunks. Nest height and nest-tree height were nearly the same in both regions.

Based on the literature reviews in the state of Oregon, there are many similarities in the vegetation on the DNF and nest-site selections of these characteristics are occurring. Differences are also apparent between study areas (i.e. The study area in eastern Oregon has more streams and creeks, and the topography is steeper versus some areas on the DNF; and southern Oregon has large expanses of oak where it is non-existent on the DNF), but similarities in forest composition occur. It is important to take this variability into account when making inferences about habitat use on the DNF from studies at other locations. (USFS 2012).

Only a few studies have investigated the foraging habitat of Cooper's hawks (Fischer 1986, Mannan and Boal 2000, Murphy et al. 1988). We know little of preferences for stands of differing densities, ages, tree sizes, or edge versus deep forests by Cooper's hawks (Reynolds 1989). However, they appear to use available forests opportunistically provided that the available types are not too dense for flight below or within the canopy (Reynolds 1989). (USFS 2012).

Nature Serve identified Cooper's hawk as secure at the global and national scale, and apparently secure in the state of Oregon. It was not identified on the Federal and State Sensitive species list, *Birds of Conservation Concern list*, Oregon Conservation Strategy, or the Partners in Flight lists. (USFS 2012).

The following is a potential list of threats due to habitat alteration for the Cooper' hawk (USFS 2012):

- Timber harvest - Treatments such as commercial and non-commercial thinning, shelterwood and clearcut harvesting, where it reduces crown cover and dense forest. Impacts to habitat will be unique from site to site due to the varying structure of the forest.
- Recreation - Habitat loss from developed and dispersed recreation, as well as new transportation routes associated with new facilities.
- Livestock grazing-Annual removal of prey habitat from grazing.
- Mining - Habitat loss from removal of forest in developing the mine. Disturbance to adjacent habitat from operations.
- Prescribed fire - Prescribed burns simulate natural forms of disturbance that occur periodically across the landscape. These forms of disturbance are likely to be important in providing future nest sites for Cooper's hawks.
- Fire suppression - Results of fire suppression include an increase in tree density and an increased likelihood of crown fires. How increased tree density affects Cooper's hawks should depend on the degree that tree density increases. If tree density is too high, it could interfere with the ability of the Cooper's hawk to fly and hunt. However, increased tree density in some areas might improve the quality of the habitat for nesting. High-intensity crown fires are presumed to be the

most deleterious consequence of fire suppression. Crown fires result in vast stand-replacing disturbances with significant habitat loss in ponderosa pine cover types, but especially in lodgepole pine cover types and in mixed conifer.

- Invasive plant establishment - Cheatgrass (Bromus spp.) could be a problem for Cooper's hawk and their prey species. This species invades areas after a disturbance and leads to the rapid accumulation of highly flammable fuel, shortening the fire-free interval. Fires occur more frequently, causing a decline in some perennial grass species, further favoring cheatgrass expansion. The result is a loss in the heterogeneity of the landscape, potentially lowering prey diversity and availability.
- Fuelwood harvest - Fuelwood harvest could adversely affect habitat if snags are removed that are used as perch sites or prey species habitat or cause disturbance during the breeding season.
- Falconry - Cooper's hawks can legally be taken for falconry in various states, including Oregon. Take by falconers is considered low; therefore it is thought to be a negligible threat.

Sharp-shinned Hawks

As part of Reynolds and Wight's study from 1978, Reynolds et al. (1982) further studied sharp-shinned hawk habitat within the same geographic reference: Coast Range and eastern Oregon, including the west and east slopes of the Cascades, and the Wallowa, Blue, Ochoco, Bly, and Steen's mountains in eastern Oregon. All nest sites in eastern Oregon were in even-aged stands of white fir (7), Douglas-fir (1), ponderosa pine (1), or aspen (1). The vegetative structure was essentially the same as in the even-aged nest sites in northwestern Oregon, with the exception that tree density and diameter were less uniform in eastern Oregon. The analysis concluded that this species nested in stands of 3 different vegetative structures: most nests (81%) were in young (25-50 years), even-aged conifer stands with single-layered canopies; 2 nests (13%) were in old-growth (200+years) stands of conifers with multilayered canopies; and 1 nest was in a dense stand of stunted quaking aspen. Sharp-shinned hawk nests in both regions were placed in the denser portion of the lower canopy against the trunk or in a crotch of a double or split trunk. (USFS 2012)

Based on the literature reviews for the state of Oregon there are many similarities in the vegetation on the DNF, including the characteristics of nest-site selections. Differences are also apparent between study areas (i.e. the study area in eastern Oregon has more streams and creeks, and the topography is steeper versus some areas on the DNF; and southern Oregon has large expanses of oak where it is non-existent on the DNF), but similarities in forest composition occur. It is important to take this variability into account when making inferences about habitat use on the DNF from studies at other locations. (USFS 2012)

Few telemetry studies have been performed on sharp-shinned hawks, therefore little information is available on foraging habitat. From observations of prey species deliveries to nests, Reynolds and Meslow (1984) estimated that sharp-shinned hawks foraged primarily in the upper canopy zone. However, Clarke (1984) and Joy (1990) observed that sharp-shinned hawks did forage near the ground. Joy et al. (1994) reported that of 11 sharp-shinned hawk nest sites, mature aspen was the most common (8 of 11) vegetation within a 2 km circle around the nest, mixed aspen-conifer was the most common "secondary" habitat (9 of 11), and conifer forest was the most "limited" habitat type. Platt (1973) monitored a male sharp-shinned hawk with radio-telemetry and observed that the male primarily hunted in a clonal-oak grassland community. The author suggested the males' attraction to this community was related to high food availability. (USFS 2012)

Nature Serve identified sharp-shinned hawk as secure at the global and national scale, and apparently secure in the state of Oregon. It was not identified on the Federal and State Sensitive species list, *Birds of Conservation Concern list*, Oregon Conservation Strategy, or the Partners in Flight lists. (USFS 2012).

Threats to the sharp-shinned hawk are similar to those addressed for the Coopers' hawk (USFS 2012).

Comparisons Of Sharp-Shinned Hawk, Cooper's Hawk, and Northern Goshawk Habitat

Several studies have compared nesting habitat use between coexisting Accipiters in North America (Fischer 1986, Kennedy 1988, Moore and Henny 1983, Reynolds et al. 1982, Reynolds 1983, Siders and Kennedy 1996, Trexel et al. 1999, Wiggers and Kritz 1991). Where these species coexist, a relationship occurs in which tree height and DBH of nest trees increases in proportion to Accipiter body size (Kennedy 1988, Reynolds et al. 1982, Siders and Kennedy 1996). For example, sharp-shinned hawk nest sites in Oregon were characterized as dense, 40 to 60-year-old even-aged conifer stands while Cooper's hawk nest sites were 50 to 80year-old conifer stands with somewhat larger, more widely spaced trees, and goshawk nest sites were dense, mature conifer stands with varying densities of mature, overstory trees (Reynolds et al. 1982). However, high interspecific overlap occurs between the species in the use of nest site characteristics such as basal area, canopy cover, and tree density (Kennedy 1988, Moore and Henny 1983, Siders and Kennedy 1996). Siders and Kennedy (1996) observed large overlaps between Cooper's hawk and goshawk nest site characteristics while Moore and Henny (1983) reported large overlaps between Cooper's hawk and sharp-shinned hawk nest site characteristics. (USFS 2012)

Surveys were conducted during goshawk monitoring. No detections or nests were identified within the project area. There are no known historic nest sites one Cooper' hawk general observation that occur within the project area. (NRIS Wildlife Database)

Through the Forest wide assessment completed for MIS, Cooper's and sharp-shinned hawk reproductive habitat was mapped across the entire Deschutes National Forest.

Approximately 1,824 acres of Cooper's hawk habitat exists within the project area. Approximately 11,026 acres of habitat occur within the Deep Canyon watershed, and approximately 275,487 acres of habitat occurs across the Deschutes National Forest.

Approximately 2,215 acres of sharp-shinned hawk habitat exists within the project area. Approximately 514,304 acres of habitat occur within the Deep Canyon watershed, and approximately 426,285 acres of habitat occurs across the Deschutes National Forest.

Table 7 and Table 8 summarize habitat acreages for both Cooper's and sharp-shinned hawks:

Table 7: Cooper's Hawk Habitat within the Melvin Butte Project Area, Watershed, and Across the Deschutes National Forest

Acres of Cooper's Hawk Habitat in the Melvin Butte Project Area	Acres of Cooper's Hawk Habitat in the Watershed	Acres of Cooper's Hawk Habitat Across the Deschutes National Forest
1,824 acres	11,026 acres	275,487 acres

Table 8: Sharp-shinned Hawk Habitat within the Melvin Butte Project Area, Watershed, and Across the Deschutes National Forest

Acres of Cooper's Hawk Habitat in the Melvin Butte Project Area	Acres of Cooper's Hawk Habitat in the Watershed	Acres of Cooper's Hawk Habitat Across the Deschutes National Forest
2,215 acres	14,304 acres	426,285 acres

For the detailed assessment on the Cooper's and sharp-shinned hawk for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measures: Acres of reproductive habitat affected.

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

Habitat conditions would remain the same for the short-term. Stand densities would continue to increase due to fire suppression. This would increase the amount of potential habitat for both species over time due to increasing canopy closures. However, with increased stand densities comes increased risk of loss from disturbance events (insects, disease, or fire). These events would likely impact the densest stands the greatest due to the stand conditions which would result in reduced availability of suitable habitat in the project area.

Areas that currently provide suitable habitat would most likely have increased mortality levels due to tree stress in the long-term. Without the treatments, stand densities will reduce the longevity of residual old growth and large tree structure that occurs in these stands. In the short-term high density stands of second growth ponderosa pine and plantations with advanced regeneration, due to overstocking and high amounts of mistletoe, the mistletoe will reduce the resiliency of these stands against bark beetle attack. In the long-term, the second growth stands and plantations will likely contain bark beetle outbreaks and high densities of small snags will occur within the project area, and habitat would diminish.

Due to stand densities within the project area and increases in mortality overtime, the risk of large scale stand replacing fire across the Melvin Butte project area also increases over time, potentially impacting high density stands that provide Cooper's and sharp-shinned reproductive habitat.

Stand resilience to insects, disease, and wildfire is measured by the Upper Management Zone (UMZ). The UMZ relates to the density of trees (basal area, trees per acre, etc.) a forest stand can support without significant mortality from bark beetles. The upper management zone is the density level at which trees begin to come under significant stress and can become susceptible to bark beetles and other insects and diseases. Forest stands managed below the upper management zone are more resilient. There are approximately 4,456 acres that have the potential to receive vegetation treatment. Under the existing condition, 92% of these stands are above the Upper Management Zone and are at risk or currently be impacted by insects and disease due to high stand densities and as a result low resiliency.

Overall, high stand densities will result in a decrease in tree vigor among all size classes reducing canopy closure and nesting habitat for both the Cooper's and sharp-shinned hawks.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Mixed Conifer Thinning From Below with and without Group Opening (MCGO and MC without openings), Non-commercial Thinning (P), Lodgepole Improvement (LPI), and Scenic Views Enhancement

Thinning in suitable habitat would occur in both second growth ponderosa pine and mulit-storied mixed conifer stands. Thinning (8" dbh and up) from below will favor the largest ponderosa pine in pure pine stands. In mixed conifer stands, thinning will favor ponderosa pine and healthy white-fir. An average basal area of 40 to 120 square feet is the object to retain in these stands. Different scenarios exist depending on the existing basal area, site productivity, and stand structure objectives. These treatments aid in maintaining the largest trees where they exist and reduce their susceptibility to fire and insects by removing competition for space and nutrients. Thinning decreases stand densities and allows for faster growth of young trees while reducing risk (removal of ladder fuels). However, canopy cover is reduced overall resulting in more open stands which may directly impact the Coopers' and sharp-shinned hawk habitat by removing reproductive habitat.

Within mixed conifer stands with group openings, although the residual basal area will range between 40 and 120 square feet, in areas dominated by white-fir that are fading from insects and disease, small group openings will be created 1-3 acres in size. This has the potential to reduce nesting habitat, but could provide added foraging opportunity due to the edge habitat created and opening that will enhance a rodent and ground nesting bird prey bases. Group opening will be planted to ponderosa pine, creating more contiguous block of fire resilient and sustainable mixed conifer stands in the long-term.

Within both Scenic Views Enhancement and LPI treatments, trees targeted for removal are primarily dead and dying trees. The Scenic Views treatment is designed to enhance scenic quality within the 16 road corridor. The treatments will not reduce suitable reproductive habitat but will remove individual fire killed trees cleaning up the woody debris from the Pole Creek Fire. The LPI treatment will not remove reproductive habitat, but will remove disease and insect ridden trees within green stands; the objective is to slow insect and disease spread to residual green stands that remain after the last beetle outbreak in the area. Residual reproductive habitat will remain.

Mowing and Burning Only (B)

Underburning will occur in stands with a more fire resistant overstory and fewer small (<9" dbh) trees than in small tree thinning units. Some thinning of small trees (up to 8" dbh) may be needed as a pre-treatment to fire. Mowing (mastication) of brush may also occur where existing brush density and height would contribute to undesirable fire behavior. These treatments will reduce both fuels associated with thinning and overall fuel loadings to acceptable levels. Fuel treatments will reduce fire risk and will reduce competition to established trees, further increasing the stands resiliency to wildfire. Mowing and burning will both be utilized as a primary stand treatment as well as a secondary follow up treatment to thinning where it is needed. Fuels treatments will also reduce the understory complexity which may result in a change or reduction in potential prey species for both Cooper's and sharp-shinned hawks. However, adjacent untreated areas may be able to provide the structural complexity for prey species that will maintain and provide potential foraging opportunities for both Cooper's and sharp-shinned hawks.

Table 9 and 10 summarizes the amount of Coopers' hawk sharp-shinned hawk reproductive habitat affected by the action alternatives identified for the Melvin Butte project.

Table 9: Total Acres of Coopers' Hawk Reproductive Habitat Associated with Each Treatment Type by Alternative for the Melvin Butte Project.

Treatment Type	Alternative 2	Alternative 3
B	186	186
HTH	342	390
MC – No Group Opening	-	301
LPI	104	104
MCGO	309	-
P	310	310
Scenic Views Enhancement	162	162
Total Acres	**1,413**	**1,453**

Table 10: Total Acres of Sharp-shinned Hawk Reproductive Habitat Associated with Each Treatment Type by Alternative for the Melvin Butte Project.

Treatment Type	Alternative 2	Alternative 3
B	236	236
HTH	381	432
HTH – No Group Opening	-	403
LPI	133	133
MCGO	415	-
P	355	355
Scenic Views Enhancement	175	175
Total Acres	**1,695**	**1,734**

Affects to Cooper's and sharp-shinned hawk habitat are similar under Alternative 2 and 3. The outcome of the affects to habitat as a result of each treatment type is the same across both action alternatives; the only thing that changes by alternative are the total acres of habitat treated. Alternative 3 was developed to address the key issues of mixed conifer thinning with small group openings and removal of large overstory trees containing dwarf mistletoe. As a result, there is a net decrease in the total acres of Cooper and sharp-shinned hawk reproductive habitat that is treated in Alternatives 3. Therefore affects to reproductive habitat by alternative is similar, since the same prescriptions will be implemented under each alternative. Total acres of reproductive habitat treated will change by alternative.

The project area and habitat varies greatly from north to south due to the increase in elevation, the rain gradient associated with the change in elevation, and the site potential associated with the inherent soil quality within this north to south pattern. To capture the importance of habitat variation across the project area, the project area was broken up into 3 areas containing high, medium and low site potential based on inherent soil quality. A habitat retention strategy for interior forest species was defined using a standard based spotted owl dispersal habitat. This criteria retains a minimum tree size and canopy cover to provide nesting habitat for all accipters. The retention strategy identified a range of retentions levels for dispersal habitat across the project area. Within stands containing low site productivity, untreated stands will be retained at a 10% level, in the areas with moderate site productivity untreated stands will be retained at a15% level, and in areas that have the highest site productivity untreated stands will be retained at the 20% level. Retention will occur on a stand by stand basis to retain areas that contain the highest densities of contiguous habitat with a stand average of a minimum of 11 inches dbh and exceeding 40% canopy closure.

Overall, approximately 1,413 acres of Coopers' hawk reproductive habitat are associated with treatments identified under Alternative 2, and approximately 1,453 acres under Alternative 3.

Overall, approximately 1,695 acres of sharp-shinned reproductive habitat are associated with treatments identified under Alternative 2, and approximately 1,734 acres under Alternative 3.

All treatments described above will aid in the development of a more disturbance resilient landscape.

The Cooper's and sharp-shinned hawks are smaller accipiter' and therefore can utilize younger stands that offer seclusion and structure for nest support than the much larger goshawk which needs larger trees for

nest support and overhead canopy to make the larger bird more discreet. Potential nesting habitat for both species would most likely develop within proposed units within 20-40 years. In the short-term, the designated cover clumps and untreated stands would provide dispersal, foraging, and potential nesting habitat.

Foraging habitat would not necessarily decrease in acreage, but would decrease in quality from mechanical shrub treatment or prescribed fire. For Cooper's and sharp-shinned hawks, the reduction of shrubs from mowing activities can impact their prey species like ground dwelling small mammals and shrub/ground nesting passerines. These ground dwelling species depend on the shrubs for nesting, and hiding cover from predators. This activity would reduce the amount of available habitat for some Cooper's and sharp-shinned hawk prey species, potentially reducing areas utilized by them for foraging as well as minimizing the availability of prey within suitable nesting areas.

In the short-term, Alternative 2 affects the fewest number of acres of habitat for sharp-shinned hawk and Cooper's Hawk and provides a complexity of treatment types to develop more fire resistant mixed conifer and ponderosa pine stands while retaining both nesting and foraging habitat.

There are approximately 4,456 acres that have the potential to receive vegetation treatments. As a result of both action alternatives, 90% of these stands will be below the Upper Management Zone. Treatment will greatly increase stand resiliency to insects, disease, and wildfire through stand density reductions.

Alternative 2 and Alternative 3 - Cumulative Impacts

Activities identified in Table 1 (cumulative effect table for wildlife) was reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to Cooper's or sharp-shinned hawks. The Deep Canyon watershed is being used as the scale for analysis for these two species. Based on that review, the potential cumulative impacts are those discussed below.

Three large wildfires have occurred within the Deep Canyon Watershed - Rooster Rock (2010), Pole Creek (2012), and Two Bulls (2014). These fires impacted potentially suitable reproductive habitat. Not every acre of the fire equated to suitable habitat for the Coopers' and sharp-shinned hawks but all this habitat is now considered unsuitable for nesting due to the fires intensity (i.e. reduced canopy cover).

The Pole Creek Fire Timber Salvage is currently salvaging 54 acres within the Deep Canyon watershed as well as ongoing salvage of danger trees on associated major routes. In addition, the BFR Ranger District is proposing to salvage approximately 250 acres within the Two Bulls Fire. Salvage is occurring or will occur within stand replacing fire areas. Therefore, no Coopers' or sharp-shinned hawk habitat will be affected by either project.

Activities proposed under Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood project have occurred or may occur in suitable habitat. Fuels reduction treatments focus on removing dead lodgepole pine among green stands to reduce fuel loading. Overall, treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances. However, stand density reduction will occur over approximately 6,810 acres within these projects and could reduce suitable habitat.

Private lands are not managed for Coopers' or sharp-shinned hawk habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term. Private lands impacted by the fires were harvested but the impacts had already occurred to potential habitat by the fire. Most of the area harvested in the last several years was a result of fire where habitat had already been impacted.

An estimated 11,026 acres of potentially suitable Coopers' hawk reproductive habitat and approximately 14,304 acres of potentially suitable sharp-shinned hawk reproductive habitat exist within the Deep Canyon watershed after the impacts of the fires and ongoing vegetation management projects.

Although treatments will enhance long-term habitat, the Melvin Butte project does propose treatments within currently suitable Coopers' and sharp-shinned hawk reproductive habitat. Under both Alternatives 2 and 3, treatments are proposed within approximately 12% of Cooper's hawk and sharp-shinned hawk habitat in the Deep Canyon watershed. With the ongoing forest management projects within the Deep Canyon watershed, there will be less than a 1% reduction in the overall habitat for the Cooper's and sharp-shinned hawk across the Deschutes National Forest.

Conclusion

Cumulatively, because this project impacts less than 1% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of both Cooper's and sharp-shinned hawk is expected on the Deschutes National Forest.

Wildlife standards and guidelines WL-13, WL-18, WL-19, WL-21, WL-27 and WL-28 will be assessed. The project is consistent with the Deschutes LRMP.

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-13/21 – Nesting habitat for at least 60 pairs of Coopers hawks and 60 pairs of sharp-shinned hawks will be provided in mixed conifer and ponderosa pine forests outside wilderness.	Meets	Habitat is available across the Forest.
WL-18/27 – Locating new roads within nest site stands will be avoided.	Not Applicable	No new road construction is proposed for this project.
WL-19/28 – Nests will be protected within ¼ mile from disturbing activities.	Meets	Mitigation measures are in place for seasonal restrictions in the event a new nest site is found.

Mitigation Measures

1. Restrict disturbance activities within ¼ mile of any newly discovered nests from April 15 through August 31. Haul restrictions will be assessed on a case by case basis. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that the species indicated is non-nesting or that no young are present that year. Waivers are valid only until the start date of the restriction of the following year.

Recommendations

None

Great Gray Owl – Survey and Manage NWFP

Existing Condition

This species was identified in the NWFP (USDA 1994a) as a protection buffer species requiring surveys due to an apparent range expansion resulting from opening up dense-canopied stands with shelterwood type harvest activities. A Regional survey protocol was developed in 1995 (USDA 1995) and was updated in January of 2004 (Version 3.0) (USDA/USDI 2004a). An amendment to the NWFP occurred in 2001 which moved the great gray owl from a protection buffer species to a Category C species. This category contained uncommon species for which pre-disturbance surveys are practical. Therefore, surveys were conducted at the project level prior to habitat disturbing activities. All known nest sites will be managed according to Management Recommendations; however these have not been established to date.

No habitat occurs within the Melvin Butte project therefore no further analysis is needed.

Red-tailed Hawk

Existing Condition

The red-tailed hawk is an abundant species occupying a variety of open to semi-open habitat types and can tolerate ranging elevations, alpine to sea level. However, they generally avoid tundra and dense, unbroken forests (DeGraaf and Rappole 1995, Timossi and Barrett 1995). Preferred habitats are open to semi-open coniferous, deciduous and mixed forests, forest edges, grasslands, parklands, rangelands, river bottomlands, and agricultural fields with scattered trees (Gilligan et al.1993, Johnsgard 1990, Timossi and Barrett 1995, DeGraaf and Rappole 1995, Marshall et al. 2003, NatureServe 2011). Forest clearings, alpine meadows, estuaries, marshes, agricultural lands, clear cuts, sagebrush plains, and high elevation environments are also used, though less commonly (Gilligan et al.1993, Timossi and Barrett 1995, Marshall et al. 2003, NatureServe 2011). (USFS 2012)

Limiting factors in preferred habitat selection are availability of suitable perches and hunting grounds open enough to locate and catch ground prey (NaturerServe 2011, Fitch et al. 1946, Janes 1984, Janes 1994). Perches can be any object that provides an unobstructed view of a red-tailed hawk territory. These objects are usually high and can be natural (e.g. tree, snag, cliff, rock, or man-made, e.g. utility pole, tower, fence) (Janes 1984, Janes 1994, Fitch et al 1946, NatureServe 2011). In the Fitch et al. (1946) study, perches were an essential aspect in red-tailed hawk territories. The perches were used for foraging, roosting, resting, mating, and defending territories. The Janes (1984) study found pairs that establish territories with more perches tend to rear more young. (USFS 2012)

Nesting occurs in large mature trees, usually at a forest edge or near an opening in canopy (Fitch et al. 1946, Moorman et al. 1996, Timossi and Barrett 1995, DeGraaf and Rappole 1995). Nests are usually placed higher in trees verses other raptors, and are generally in the largest, tallest tree available or smaller deformed trees where branch structure supports this higher placement (DeGraaf et al. 1991, Timossi and Barrett 1995, DeGraaf and Rappole 1995, La Sorte et al. 2004). Red-tailed hawks seem to prefer nesting trees with open crowns. The placement of a nest is usually next to the trunk of a tree in a crotch or fork from 30 to 90 feet (9-27 m) above the ground (DeGraaf et al. 1991, Verner and Boss 1980, Timossi and Barrett 1995). Nests are often reused from year to year provided the nest is not occupied by earlier nesting raptors and is in suitable condition (Fitch et al. 1946, DeGraaf and Rappole 1995, Tesky 1994). In treeless areas, nests are built on artificial nest structures, the crossbars of utility poles, and towers (Timossi and Barrett 1995 DeGraaf and Rappole 1995, Marshall et al. 2003, NatureServe 2011).

Occasionally, red-tailed hawks will use and add material to an existing raven, crow, gray squirrel, or large accipiter nest. La Sorte et al. (2004) found steep slopes are an important factor for a nest site. The steep slope allows for easy entry to the nest from above the canopy layer, allowing for unobstructed views of surrounding area and protection from the slope. Red-tailed hawks will use the same nest for multiple years, particularly if the nest is in suitable location and suitable condition (Fitch et al. 1946, Young 1989 in Tesky 1994). (USFS 2012)

On the Deschutes National Forest, past harvest activities had produced habitat conditions favorable for red-tailed hawks by clear-cutting stands adjacent to mature and late-seral stands. This provided open areas for foraging adjacent to potential roosting and nesting habitat. Due to the age of the clear cuts, many have grown in with trees and shrubs diminishing foraging availability of the red-tailed hawk.

The red-tailed hawk is not on any federal, state, or other conservation lists. Globally, the population is increasing and has no significant threats (NatureServe 2011). Nationally, the population is increasing or stable in most areas (NatuerServe 2011). In Oregon, the red-tailed hawks are secure; the population is not decreasing (NatureServe 2011). (USFS 2012)

Through the Forest wide assessment completed for MIS, red-tailed hawk reproductive habitat was mapped across the entire Deschutes National Forest. Approximately 1,048 acres of habitat exists within the project area. Approximately 2,424 acres habitat occurs within the Deep Canyon watershed, and approximately 192,492 acres of habitat occurs across the Deschutes National Forest. The following Table 11 summarizes these acreages:

Table 12: Red-tailed Hawk Habitat within the Melvin Butte Project Area, Deep Canyon Watershed, and Across the Deschutes National Forest.

Acres of Red-tailed Hawk Habitat in the Melvin Butte Project Area	Acres of Red-tailed Hawk Habitat in the Deep Canyon Watershed	Acres of Red-tailed Hawk Habitat Across the Deschutes National Forest
1,048 acres	2,424 acres	192,492 acres

For the detailed assessment on the red-tailed hawks for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measure: Acres of reproductive habitat affected.

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

With the no action alternative, suitable nest trees that occur within dense stands would most likely have increased mortality due to tree stress. Without treatments in the second growth stands, stand densities will prolong future development of larger nesting trees. These high density stands will remain susceptible to bark beetle activity and the susceptibility will increase over time. High stand densities will result in the overall decrease in tree vigor among all size classes. The most significant effect of high stand densities will be the gradual loss of the existing large-tree component/nesting habitat that is likely to be much faster than if the stand densities had been reduced making stands more resilient to insects, disease, and wildfire.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Dwarf Mistletoe (DM), Prescribe Burning (B), Non-Commercial Thinning (P)

These treatmenst would retain and enhance nesting habitat, and associated large tree structiure (i.e. trees >21" dbh). Both alternatives have the potential to increase foraging areas for red-tailed hawks by thinning from below (under 21" dbh) and potentially increasing access to prey at ground level over the associated acres. Thinning from below will help to decrease the stress on the larger overstory trees, thus retaining potential nest sites for the long-term (>20 years). Treatments to early and mid-seral stands would promote and accelerate the development of LOS.

Under alternative 2, DM treatments will thin trees containing mistletoe to reduce the rate of spread on 63 acres identified as habitat. This treatment will occur in old plantation where 4-14 trees per acre greater than 21 inches dbh occur. Trees infested with dwarf mistletoe will be removed or girdled and left as a snag. Approximately 4 snags per acre will be created from trees containing dwarf mistletoe, potentially retaining habitat within the 63 acres.

Non-commercial thinning will occur in plantations, thinning will reduce small tree densities (<8" inches dbh). Habitat exists in these stands in areas that individual old growth trees were retained as seed trees. No large trees will be removed from these areas. In its current condition foraging is very limited, thinning will open up the plantations enhancing foraging habitat by allowing better access to the forest floor and rodent populations.

The reduction of shrubs from mowing and burning as a follow up to thinning and units identified as prescribed burning only can impact prey species of ground dwelling small mammals (ground squirrels, cottontails, voles, and pocket gophers). These ground species depend on the shrubs for cover for hiding from predators and the forbs for food. This activity would reduce the amount of available habitat for red-tailed hawk prey species, potentially reducing areas utilized by them for foraging as well as minimizing the availability of prey within nesting areas. Impact from mowing and burning are short in duration (<10 years) and will provide a high diversity of prey habitat (grasses, forb and shrubs) in the long-term.

In addition, during prescribed fire treatments incidental snags could be lost from fire reducing large snags that also provide nesting opportunities, but live trees may be converted to snags due to burning. Mortality of snags in ponderosa pine habitat during prescribed fire treatments in Arizona and California ranged from 20% (Randall-Parker and Miller 2002), 45% (Horton and Mannan 1988), and 56% (Bagne et al. 2008). All three studies found that larger diameter ponderosa pine trees were least likely to die, at least in the short-term. Horton and Mannan (1988) found a 20-fold increase in abundance of snags <15 cm dbh. Several studies showed that the highest snag losses were in areas where a long period of fire exclusion had occurred (Bagne et al. 1988, Holden et al. 2006). Bagne et al. (2008) and Horton and Mannan (1988) found that re-entry burns had a much lower mortality rate for snags, presumably because the trees that did not burn during the first entry were more resilient. Loss of snags from prescribed fire was partially mitigated by the creation of new snags (Horton and Mannan 1988, Bagne et al. 2008).

Table 12: Total Acres of Red-tailed Reproductive Habitat Associated with Each Treatment Type by Alternative

Treatment	Alternative 2	Alternative 3
B	201	201
DM	63	
HTH	374	438
P	160	160
Total Acres Affected	**798**	**799**

Impacts to habitat will be minimal, but treatments will promote the development of LOS stands promoting large tree production and red-tailed hawk habitat in the long-term. Affects to red-tailed hawk habitat are similar under Alternative 2 and 3. The outcome of the affects to habitat as a result of each treatment type is also consistent across all action alternatives.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Table 1 (cumulative effects table for wildlife) was reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to red-tailed hawk reproductive habitat. The Deep Canyon watershed is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Three large wildfires have occurred within the Deep Canyon Watershed – Rooster Rock, Pole Creek and the Two Bulls Fires. These fires impacted potentially suitable reproductive habitat. Not every acre of the fire equated to suitable habitat for the red-tailed hawk. These fires created ideal foraging habitat due to the reduction of small trees and ground cover. Additionally, large snags and large residual green trees provide ample nesting opportunities directly adjacent to foraging habitat.

The Pole Creek Fire Timber Salavage project is ongoing and is salvage logging approximately 54 acres and the Pole Creek Fire Danger Tree Removal project is also salvage logging incidental danger trees along major routes within the Deep Canyon Watershed. The timber salvage project proposes to remove large snags greater than 21 inches dbh but will retain 3 per acre within salvage units. The BFR Ranger District is proposing to salvage log 250 acres of the Two Bulls Fire. No large snags over 21 inches dbh are proposed for removal and no suitable green nest trees over 21 inches dbh are proposed for removal.

Activities proposed under the Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood projects have occurred or may occur in suitable habitat. Fuels reduction treatments focus on removing dead lodgepole pine among green stands to reduce fuel loading and do not propose to remove large trees >20 inches dbh that could provide suitable nest trees. The projects also do not focus on removing large trees >20 inches dbh. Overall, treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances over approximately 7,060 acres.

Private lands are not managed for red-tailed hawk habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term. Private lands impacted by the fires were harvested but the impacts had already occurred to potential habitat by the fire. Most of the area harvested in the last several years was a result of fire where habitat had already been impacted.

An estimated 2,424 acres of potentially suitable red-tailed hawk reproductive habitat exist within the Deep Canyon watershed after the impacts of the fires and ongoing vegetation management projects.

The Melvin Butte project proposes treatments within approximately 799 acres of suitable reproductive habitat that. All treatments will retain suitable habitat but will reduce tree densities by thinning from below. Within the DM treatments, individual live trees >21 inches ponderosa pine could be removed on across the associated 63 acres, but will enhance long-term habitat by removing diseased trees that are infecting future stands. Populations are expected to increase within the Deep Canyon watershed as a result of treatments that are reducing the risk of insects, disease, and stand replacing fire to existing suitable habitat. In addition, thinning from below will accelerate the development of future LOS enhancing habitat across the watershed in the long-term.

Although treatments will enhance long-term habitat, the Melvin Butte project does propose treatments within currently suitable red-tailed hawk reproductive habitat. Under both Alternative 2 and 3, treatments are proposed within approximately 32% of red-tailed hawk habitat in the Deep Canyon watershed. With

the ongoing forest management projects within the Deep Canyon watershed, there will be less than a 1% reduction in the overall habitat for the red-tailed hawk across the Deschutes National Forest.

Conclusion

The Melvin Butte project does not propose any treatments that highly degrade suitable red-tailed hawk reproductive habitat. Cumulatively under Alternative 2 and 3, ponderosa pine >21 inches dbh will be retained while thinning will focus on smaller trees as well as less desirable tree species. Cumulatively, because this project impacts less than 1% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of the red-tailed hawk is expected on the Deschutes National Forest.

Consistency with the Deschutes LRMP
Wildlife standard and guidelines WL-2 and WL-3 will be assessed. The project is consistent with the Deschutes LRMP.

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-2 – Maintain forested character at least 300 feet surrounding active nest sites.	Meets	There are no known nests within the project area. If a nest is located, measures will be incorporated to meet this standard.
WL-2 – While timber management may occur, maintain at least 4 dominant overstory trees per acre suitable for nest and perch trees, favoring ponderosa pine.	Meets	Snag retention guidelines will be in place to provide for large snag structure. Large green trees expected to live will not be removed with this project.
WL-3 – Seasonal restrictions will be in effect for disturbing activities within ¼ mile of active nests.	Meets	Mitigation measures are in place in the event a nest site is found.

Mitigation Measures

1. Disruptive work activities will not take place within ¼ mile of any newly discovered nest sites from March 1 through August 31. Haul restrictions will be assessed on a case by case basis. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that the species indicated is non-nesting or that no young are present that year. Waivers are valid only until the start date of the restriction of the following year.

Recommendations
None

Big Game

Existing Condition

Deer: The most important deer habitats in Eastern Oregon are summer habitat, including areas needed for reproductive activities and winter habitat. Preferred summer habitat provides adequate forage to replace body reserves lost during winter and to maintain normal body functions. Summer habitat also includes areas specifically used for reproductive purposes. These areas must have an adequate amount of succulent vegetation, offering highly nutritional forage. In addition, areas used for reproduction should provide isolation from other deer, security from predators and minimal competition from other ungulates. Summer habitat areas are common throughout Eastern Oregon, and can be found in areas varying from lowland agricultural lands to high elevation mountain areas. Winter habitat is found predominately in lower elevation areas of Eastern Oregon. These areas usually have minimal amounts of snow cover and provide a combination of geographic location, topography, and vegetation that provides structural protection and forage. Due to the low nutritive values of available forage during the winter, deer are forced to rely on their body reserves acquired during the summer for winter survival. (ODFW 2002). (USFS 2012).

The entire Melvin Butte project area is within mule deer summer range. Deer summer range was identified within the Deschutes Land and Resource in forested stands at higher elevations which mule deer occupy from late spring to late fall. High quality forage is essential in summer range, providing nutrients for antler growth, milk production for lactating does, providing energy for the breeding season in late fall and maintaining reserves to assist with winter survival. This type of high quality forage is provided by the development of nutrient rich early seral forbs and shrubs. High quality forage is produced by prescribed and wildfires, and tree thinning which open stands enhancing shrub and forb production by reducing shading.

Two primary Standards and Guidelines which are associated with summer range include hiding cover and open road densities. Hiding cover is a habitat attribute which provides escapement from predation as well as avoidance from harassment potential by hunters and other recreation use. Road densities are used mitigate habitat impacts from vegetation management, and where hiding cover S&G's cannot be met, road densities are used to further eliminate disturbance from an area. The guidelines for hiding cover states, "Hiding area must be present over 30% of National Forest Land in each implementation unit, resulting in 70% of each implementation unit existing as a hiding area or within 600 feet of a hiding area. Black bark stands will not be used to measure conformance". A separate set of guidelines are used to address "Black Bark Pine Management" which are second growth pine stands 60-80 years old. These stands provide very poor quality hiding cover due to the lack of horizontal structure and a single age class of trees. (USFS 2012)

The project is within the Upper Deschutes Wildlife Management Unit (WMU) designated by ODFW. The population objective for mule deer within this WMU is 2,200 wintering deer. Although there has been a precipitous drop in population from 1990 to 2011, buck to doe ratios continue to meet Management Objectives (M.O.) and therefore allowable harvest has not changed from 2,200 available tags. However, due to the decline in the population and low fawn recruitment, very minimal antlerless harvest occurs. (USFS 2012)

The conservation status based on the Nature Serve ranking indicate the mule deer is secure globally, nationally, and state wide. (USFS 2012).

The following is a potential list of threats to mule deer habitat identified within their range in the intermountain west as well as the Deschutes National Forets (USFS 2012):

- Vegetative species composition has been modified - Invasive plants replacing native shrubs.

- ❖ Vegetative structure has been modified - In the absence of fire, the expansion of juniper woodlands reducing diversity of understory grasses, forbs, and shrubs.
- ❖ Nutritional quality has decreased – as plants mature and are not regenerated through a disturbance, the nutritional quality also diminishes.
- ❖ Usable habitat has been lost and fragmented due to human encroachment and associated activities – due to urbanization, towns are expanded and developments are built within historic winter range areas. Gas and oil expansion also affects migration and habitat loss. On a local level, due to the size of the Central Oregon Community, motor vehicle collisions and traffic volume have created barriers to mule deer migration and removed segments of the population.
- ❖ Poaching- removal of individuals from the population due to poaching is the largest loss of deer above all in Central Oregon.

The following Table 13 addresses Standards and Guides outside of Deer Management Area 7 (Mule Deer Summer Range) specific to the management of functional summer range habitat:

Table 13. Summer Range S&G's.

Hiding Cover: 30% Suitable hiding cover must meet one of the following criteria.	**Open Road Densities**	**Black Bark: 10% of treated stand will be in clumps to provide visual screening throughout and meet the following criteria**
Six acre or larger stand capable of hiding 90% of a standing adult deer at 200 feet.	≤ 2.5 mi. per sq. mile	A minimum of ½ acre in size which have not been thinned or harvested for at least 20 years. Small clumps will be suitable in dense stands but larger (4 or 5 acre) clumps may be needed in more open stands.
Six acres or larger stand with an average height of 6 feet and has not been thinned in 15 years		Clumps will be dispersed throughout the unit so that visual screening is provided by the clumps in a combination with topographic features.
Residual clumps of ½ acre or larger stands within units with advanced regeneration and at least 12 greater than 7 dbh per acre remaining after harvest. Clumps should be located away from roads.		

Through the Forest wide assessment completed for MIS, mule deer hiding cover within the summer range was mapped across the entire Deschutes National Forest. Within the analysis area, approximately 3,394 acres of hiding cover occurs throughout the project area. Approximately 16,999 acres of hiding cover occurs within the Deep Canyon Watershed, approximately 716,957 acres of hiding occurs across the Deschutes National Forest. The following Table 14 summarizes these acreages.

Table 14. Mule Deer Hiding Cover within the Melvin Butte Project Area, Deep Canyon Watersheds, and Across the Deschutes National Forest.

Acres of mule deer hiding cover in the Melvin Butte Project Area	Acres of hiding cover in the Deep Canyon Watershed	Acres of hiding cover Across the Deschutes National Forest
3,394 acres	16,999 acres	716,957 acres

The Melvin Butte project is associated with the Deep Canyon 10th field watershed. Within the summer range associated with the watershed, on average open road densities exist at a level of 3.04 miles per square miles.

Within the watershed, approximately 16,999 acres is identified as summer range. Approximately, 50% of the watershed exists as hiding cover.

Current open road densities within the Melvin Butte project area exist at a level of 5.98 miles per square mile.

Current hiding cover exists over 63% of the Melvin Butte project area.

For the detailed assessment on the Mule Deer for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Elk: The Deschutes NF has one primary allocation for the management of elk habitat on forest. Eleven Key Elk Habitat Areas (KEHAs) occur across the forest to provide optimum habitat conditions for both summering and wintering elk herds. No KEHAs occur within the Melvin Butte project area and therefore no specific standards and guides apply to the project. Although elk do occur within the project area they are very limited in number. Management of hiding cover and open road densities for mule deer will also provide cover and security for this small population of elk. No further analysis of elk habitat will be addressed in this document.

Measures:

1. ***Acres of hiding cover affected.***
2. ***Miles of open road densities reduced.***

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

Sumer range habitat is the most important habitat in that it provides the basis of building fat reserves for mule deer, keeping animals healthy and alive through the winter months.

Without treatment, it is expected hiding cover would increase in the short-term with increasing stand densities. In the long-term, as stands mature and stand densities increase so does the risk of insects, disease, and wildfire which has been identified as a major factor contributing to the loss of hiding cover across the Forest. Over the last 10 years, more than 100,000 acres of stand replacing fire has occurred on the Deschutes National Forest, severely impacting cover in the short-term. Disturbance species, such as ceanothus, provide an increased forage opportunity. This forage is only beneficial to deer for approximately 10-15 years when nutrient levels diminish and the forage is no longer beneficial. Shrubs begin to dominate burned stands and provide cover, but in many areas with broken terrain, shrubs are not robust enough to provide viable cover. In the long-term, viable forage in these burned areas can be

drastically reduced if fire is not utilized to promote a continuous cycle of regenerating shrubs, and cover is reduced until regenerating stands develop enough to once again provide cover.

Alternative 2 and 3- Direct and Indirect Effects

Ponderosa Pine Dwarf Mistletoe Treatments (DM), Non-commercial Thinning (P), Thinning From Below (HTH), Mixed Conifer Thinning From Below with Group Openings (MCGO), Mixed Conifer Thinning From Below without Group Openings (MC without openings)
Small tree thinning associated with non-commercial thinning in plantations and thinning understories in dwarf mistletoe treatment areas will reduce dense understories and will result in a reduction of hiding cover. The size of hiding cover patches will be decreased and there will be greater distances between these patches. This may result in deer being more visible to predators and hunters and may result in higher mortality rates. It will also decrease the thermal cover properties of these patches by altering the microsite climate (warmer in the summer). However, treatments will open up the stands allowing more sunlight to hit the forest floor, which may stimulate herbaceous plant growth increasing summer foraging opportunities.

Thinning from below associated with HTH and MC - without group openings would result in similar impacts as non-commercial thinning. However, there will be additional removal of larger trees, which will reduce hiding. Reduction in overhead canopy will also result in increased snow depths making the transition to winter range slightly more difficult with early snows.

Mixed conifer thinning from below with group opening treatments will result in high edge to cover ratios, which is favorable to big game. This will result in forage being in close proximity to cover especially if openings are small (1 to 3 acres in size). Forage quality will be increased in the openings, which will increase summer foraging opportunities.

Prescribed Burning (B)
Underburning, which may include mowing, may impact both forage quality and quantity as well as hiding cover in the short-term. Mowing and burning in high shrub areas will reduce summer forage opportunities. However, mowing/underburning of shrubs will result in shrub cycling reducing the amount of late seral shrubs that have low nutrient levels, stimulating the growth and development of new early seral vegetation rich in nutrients, aiding the mule deer in fat storage for winter months. The project area contains predominantly late seral ceanothus in the higher elevations with inclusions of mid seral manzanita and bitterbrush at the lower elvations. Mowing/underburning will reset large areas to early seral shrubs of bitterbrush and ceanothus stimulating the growth of herbaceous plant material increasing summer foraging opportunities for the next 10 years. This treatment may also reduce down logs across the project area. Down logs provide cover opportunities for bedding at night and security for fawns while does are away foraging.

Lodgepole Pine Improvement (LPI)
In these areas, the mountain pine beetle has been active over the last 15 years. This treatment proposes to remove trees that have fading crowns and are dying from insects and disease reducing spread to adjacent green stands. The objective is to reduce the rate of spread to green stands enhancing the longevity of the green stands. Activities will not remove hiding cover, however removing fading trees could potentially retain residual hiding cover for a longer period of time. Hiding cover will continue to develop in this area as the lodgepole pine regenerates over the next 10 years providing contiguous stands of hiding cover.

The following Table 15 summarizes the amount of deer hiding cover associated with each action alternative identified for the Melvin Butte project area.

Table 15. Total Acres of Mule Deer Hiding Cover Associated with each Treatment Type by Alternative.

Treatment Type	Alternative 2	Alternative 3
B	483	483
DM	65	-
HTH	587	653
MC – No Group Opening	-	662
LPI	184	184
MCGO	722	-
P	439	439
Total Acres.	**2,480**	**2,421**

Affects to deer hiding cover are similar under Alternative 2 and 3. The outcomes of the affects to cover as a result of each treatment type are also consistent across both action alternatives. Due to the changes in each alternative to address key issues, the ranges of treatments prescribed vary by alternative and directly reflect the total amount of deer cover that will be treated. It was identified that the LPI will not remove cover and therefore will not contribute to the cover calculation by alternative.

Approximately 719 acres of hiding cover will be retained without treatment under Alternative 2 and approximately 779 acres under Alternative 3.

Overall, approximately 2,480 acres of hiding cover is associated with Alternative 2 which will maintain 13% hiding cover across the project area, and approximately 2,421 acres under Alternative 3 maintaining 14% hiding cover.

Lastly, approximately 7.71 miles of road are proposed to be decommissioned under both action alternatives. This will reduce road densities in the project area from 5.98 mile/sq. mile to 4.66 miles/sq. mile. Road decommissioning will reduce road densities limiting the amount of motorized disturbance to deer within the project area, maximizing habitat effectiveness in the newly created foraging areas.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Table 1 (cumulative effects table for wildlife) was reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to big game. The Deep Canyon watershed is being used as the scale for analysis for big game, in particular mule deer summer range and the effects to cover. Based on that review, the potential cumulative impacts are those discussed below.

Three large wildfires have occurred within the Deep Canyon Watershed – Rooster Rock (2010), Pole Creek (2012), and the Two Bulls Fires (2104). These fires impacted potentially suitable hiding cover. Not every acre of the fire equated to hiding cover but allof this habitat is now considered unsuitable hiding cover due to the fires intensity (ie: reduced canopy cover).

The Pole Creek Fire Timber Salvage project is ongoing and is salvage logging approximately 54 acres and the Pole Creek Fire Danger Tree Removal project is also salvage logging incidental danger trees along major routes. No hiding cover is associated with salvage logging. The BFR Ranger District is proposing to salvage log 250 acres of the Two Bulls Fire. No hiding cover is associated with salvage units since cover was lost during the fire.

Activities proposed under the Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood projects have occurred or may occur in areas

containing suitable hiding cover. Fuels reduction treatments focus on removing dead lodgepole pine among green stands to reduce fuel loading and do not propose to thin dense stands of regenerating trees that provide the higher quality hiding cover. Of all the projects listed, the Ursus project has the highest potential of reducing hiding cover due to the thinning from below in the mixed conifer stands associated with the 5900 acres of project.

Of the 3,394 acres of hiding cover identified within the project area Alternative 2 will treat approximately 2,480 acres and Alternative 3 will treat approximately 2,421 acres of hiding cover, reducing hiding cover in the watershed. Approximately, 42% of the watershed will exist as hiding cover under both alternatives post treatment, exceeding Forest Plan Standards and Guidelines of 30%.

Road densities are in excess of Forest Plan S&G's for deer summer range. The project will decommission approximately7.71 miles of road reducing road densities in the watershed. Although the average road density will still exceed Forest Plan S&G's the project will continue to move road densities toward those S&G's.

Conclusion

The Melvin Butte project is within the Upper Deschutes herd management unit identified by the Oregon Department of Fish and Wildlife. Although the overall population of mule deer has dropped far below management objective, the buck to doe ratio annually meets ODFW objective of 15 bucks per 100 does. Limiting factors for mule deer population as identified within MIS Assessment for Mule Deer is providing quality forage and cover. Summer range habitat is critical for mule deer, where large areas of early seral browse in areas of limited disturbance is extremely important to build fat reserves needed to get deer through the rut and the directly following winter months. (USFS 2012)

The No Action Alternative could affect mule deer and their habitat due lack of early seral forage within the project area and in the Watershed. In the event of a wild fire, areas of early seral forage could be created, but due to road densities all security cover would be lost and deer would be more vulnerable to disturbance and predation.

The Action Alternatives have the potential to benefit mule deer summer habitat. Through prescribed fire treatments, thinning with group openings, and thinning from below with prescribed fire as a follow up treatment, treatments will open stands creating earl seral vegetation providing new areas of summer forage. Hiding cover is maintained through project design, maximizing forage production and providing screening cover for animals to disperse through the project area. Lastly, existing road closures and decommissioning user created roads and trails will further reduce disturbance, increasing the habitat effectiveness of newly created foraging areas. In the long-term Alternative 2 is the most proactive alterative in developing big-game habitat. Treatments are designed to provide long-term foraging opportunities, while retaining existing hiding cover and developing future hiding cover throughout summer habitat.

Treatments associated with the Melvin Butte project will retain 42% of the hiding cover within the summer range associated with the Deep Canyon Watershed. This exceeds the Deschutes LRMP Standards and guides. The overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued

Consistency with the Deschutes LRMP

Wildlife standard and guidelines WL-52 through WL-59 will be assessed for deer. The project is consistent with the Deschutes LRMP.

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-52 – Provide conditions to support at least 2200 deer within the Upper Deschutes Unit.	Meets	Closing roads to reduce human disturbance.
WL-53 – Target open road densities are 2.5 miles per square mile to achieve deer summer range habitat effectiveness targets.	Moving Towards	Resulting open road densities are still above the recommended densities. However, this project will continue to decommission 7.71 miles of roads contributing to road density reductions.
WL-54 – Hiding areas must be present over at least 30% of National Forest land in each implementation unit.	Meets	Hiding cover will exist over approximately 42% of the Deep Canyon Watershed.
WL-55 – Hiding areas will be dispersed throughout the implementation unit.	Meets	Residual untreated stands are retained throughout the project area.
WL-56 - Travel corridors will be provided by linking stands (to assist in meeting hiding cover needs).	Meets	Untreated stands were designated to provide connectivity throughout the project area.
WL-57 – Hiding areas are assumed to provide suitable thermal cover conditions on summer range.	Meets	Untreated stand exceed canopy cover and tree heights to provide thermal cover.
WL-58 – If possible, a narrow strip of trees should be left along roads to reduce view distances.	Meets	Thinning will be implemented in a mosaic fashion to retain small untreated clumps and will be integrated with retention stands. Therefore retaining screening along roads.
WL-59 – Approximately 10% of treated black bark pine stands will be in clumps that will provide visual screening throughout the area.	Meets	Mosaic thinning and untreated stands of black bark pine will be retained exceed the retention standards for black bark ponderosa pine. No wildlife clumps will be left within the 600’ defensible space corridor along the private property boundary of Cascade Forest.

Mitigation Measures

None

Recommendations
None

Birds of Conservation Concern

In January 2001, President Clinton issued an executive order on migratory birds directing federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitats. Federal agencies were required within two years to develop a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to conserve migratory birds including taking steps to restore and enhance planning processes whenever possible. To meet this goal in part the U.S. Fish and Wildlife Service developed the Birds of Conservation Concern released in December 2002 (USFWS 2002) and an update to the original list was released in 2008 (USFWS 2008a).

Birds of Conservation Concern are species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973. Birds of Conservation Concern encompasses three distinct geographical scales – North American Bird Conservation Initiative (NABCI) Bird Conservation Regions (BCRs), USFWS Regions, and the National scale which represents species that have the highest conservation priorities in the United States, including the island "territories" in the Pacific and Caribbean.

Bird species considered for inclusion on lists in this report include non-game birds, game birds without hunting seasons, subsistence-hunted non-game species in Alaska, landbirds, shorebirds, waterbirds, and Endangered Species Act candidate, proposed endangered or threatened, and recently delisted species. While all of the bird species included in BCC are priorities for conservation action, the list makes no finding with regard to whether they warrant consideration for ESA listing. The goal is to conserve avian diversity in North America and includes preventing or removing the need for additional ESA bird listings by implementing proactive management and conservations actions (USFWS 2008a). The 2008 lists were derived from three major bird conservation plans: the Partners in Flight North American Landbird Conservation Plan, the United States Shorebird Conservation Plan, and the North American Waterbird Conservation Plan. Conservation concerns stem from population declines, naturally or human-caused small ranges or population sizes, threats to habitat, or other factors.

Bird Conservation Regions (BCRs) were developed based on similar geographic parameters and are the basic units within which all bird conservation efforts should be planned and evaluated (USFWS 2008a). One BCR encompasses the Melvin Butte project area – BCR 9, Great Basin. See Table 16 for a list of the bird species of concern for the area, the preferred habitat for each species, and whether there is potential habitat for each species within the Melvin Butte project area.

Table 16: BCR 9 (Great Basin) BCC 2008 list

Bird Species	Preferred Habitat	Habitat within the Melvin Butte Project Area (Y or N)
Greater Sage Grouse (Columbia Basin DPS)	Sagebrush dominated Rangelands	No
Eared Grebe (non-breeding)	Open water intermixed with emergent vegetation	No
Bald Eagle	Lakeside with large trees	No
Ferruginous Hawk	Elevated Nest Sites in Open Country	No
Golden Eagle	Elevated Nest Sites in Open Country	No

Peregrine Falcon	Cliffs	No
Yellow Rail	Dense Marsh Habitat	No
Snowy Plover	Dry Sandy Beaches	No
Long-billed Curlew	Meadow/Marsh	No
Marbled Godwit	Marsh/Wet Meadows	No
Yellow-billed Cuckoo	Dense riparian/cottonwoods	No
Flammulated Owl	Ponderosa pine forests	Yes
Black Swift	Cliffs associated with waterfalls	No
Calliope Hummingbird	Open mountain meadows, open forests, meadow edges, and riparian areas	No
Lewis's Woodpecker	Ponderosa pine forests	Yes
Williamson's Sapsucker	Ponderosa pine forests /Mixed Conifer Large Snags	Yes
White-headed Woodpecker	Ponderosa pine forests	Yes
Loggerhead Shrike	Open country with scattered trees or shrubs	No
Pinyon Jay	Juniper, juniper-ponderosa pine transition, and ponderosa pine edges	No
Sage Thrasher	Sagebrush	No
Virginia's Warbler	Scrubby vegetation within arid montane woodlands	No
Green-tailed Towhee	Open ponderosa pine with dense brush	No
Brewer's Sparrow	Sagebrush clearings in coniferous forests/bitterbrush	No
Black-chinned Sparrow	Ceanothus and oak covered hillsides	No
Sage Sparrow	Unfragmented patches of sagebrush	No
Tricolored Blackbird	Cattails or Tules	No
Black Rosy Finch	Rock outcroppings and snowfields	No

Landbird Strategic Plan

The Forest Service has prepared a Landbird Strategic Plan (USDA 2000) to maintain, restore, and protect habitats necessary to sustain healthy migratory and resident bird populations to achieve biological objectives. The primary purpose of the strategic plan is to provide guidance for the Landbird Conservation Program and to focus efforts in a common direction. On a more local level, individuals from multiple agencies and organizations with the Oregon-Washington Chapter of Partners in Flight participated in developing publications for conserving landbirds in this region. A Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington was published in June 2000 (Altman 2000), A Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington was published in March 2000 (Altman and Holmes 2000), and A Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington was published in May 2000 (Altman 2000). These documents outline conservation measures, goals and

objectives for specific habitat types found on the east-slope of the Cascades and the focal species associated with each habitat type. These documents provide recommendations for habitat management. The East-Slope Cascades Strategy covers the Deschutes National Forest and the forest is contained within the Central Oregon subprovince. See Tables 17 and 18 for specific habitat types highlighted in these documents, the habitat features needing conservation focus and the focal bird species for each.

A Conservation Strategy for Landbirds of the East-slope of the Cascade Mountains in Oregon and Washington

Table 17: Priority habitat features and associated focal species for the East-Slope Cascade Strategy

Habitat	Habitat Feature	Focal Species for Central Oregon	Habitat within the Project Area (Y or N)
Ponderosa Pine	Large patches of old forest with large snags	White-headed woodpecker	Yes
	Large trees	Pygmy nuthatch	Yes
	Open understory with regenerating pines	Chipping sparrow	Yes
	Patches of burned old forest	Lewis' woodpecker	Yes
Mixed Conifer (Late-Successional)	Large trees	Brown creeper	Yes
	Large snags	Williamson's sapsucker	Yes
	Interspersion grassy openings and dense thickets	Flammulated owl	Yes
	Multi-layered/dense canopy	Hermit thrush	Yes
	Edges and openings created by wildfire	Olive-sided flycatcher	Yes
Lodgepole Pine	Old growth	Black-backed woodpecker	Yes
Whitebark Pine	Old growth	Clark's nutcracker	No
Meadows	Wet/dry	Sandhill Crane	No
Aspen	Large trees with regeneration	Red-naped sapsucker	No
Subalpine fir	Patchy presence	Blue Grouse	No

Cavity Nesters (Woodpeckers) on the Deschutes National Forest

In addition, the Deschutes LRMP identifies all Cavity Nesting Birds that occur on the Forest as a Management Indicator Species. There are 11 species of cavity nesters that occur on the Deschutes National Forest. Table 18 contains the list of bird species.

Table 18: Cavity Nesters (Woodpeckers)

Habitat	Species	Habitat Occurs in the Melvin ButteProject Area (Y or N)
Lodgepole pine - old growth	Black-backed woodpecker	Yes

Deciduous/mixed deciduous and conifer or riparian - Aspen or riparian cottonwood	Downy woodpecker	No
Ponderosa pine/mixed conifer - open stand open canopies	Hairy woodpecker	Yes
Ponderosa pine - burned forest	Lewis' woodpecker	Yes
Various conifer forest habitats - open stands large tree structure, forest edges	Northern flicker	Yes
Mixed conifer-Late seral Grand fir/white-fir type, multi-layered canopy	Pileated woodpecker	Yes
Ponderosa pine - large trees	Pygmy nuthatch	Yes
Various conifer forest - mature and old growth forest only.	Red-breasted nuthatch	Yes
Aspen with ponderosa pine - Riparian aspen or cottonwood	Red-breasted sapsucker	No
Aspen - large trees with regeneration	Red-naped sapsucker	No
Sub-alpine and alpine forests- old forests of lodgepole pine, grand-fir/white-fir, Engelmann spruce/subalpine fir, whitebark pine, and mountain hemlock. Also post fire habitats	Three-toed woodpecker	Yes
Ponderosa pine - large trees	White-breasted nuthatch	Yes
Ponderosa pine - old growth forest with large snags	White-headed woodpecker	Yes
Mixed Conifer - large trees	Williamson sapsucker	Yes

Following effects analysis address potential impacts to Bird of Conservation Concern, Land Bird Focal Species and MIS woodpecker. The bald eagle, white-headed and Lewis' woodpeckers were addressed in Biological Evaluation for TES species and therefore will not be addressed in this effects analysis.

Ponderosa Pine – Large Trees and Snags – Pygmy Nuthatch, Red-breasted nuthatch, white-breasted nuthatch, and Chipping Sparrow

Existing Condition

The pygmy nuthatch is a resident of ponderosa pine forests east of the Cascades but outside the breeding season, is found just outside the ponderosa pine zone. The red-breasted nuthatch is most abundant in old-growth and mature conifer forests during the breeding season in the Cascade Range but can be found in younger stands at variable densities. The red-breasted nuthatch forages on tree trunks and main branches (Marshall et al. 2003). The white-breasted nuthatch is found in two main habitat types in Oregon – oak and ponderosa pine (Marshall et al. 2003). East of the Cascade crest, they are sympatric with both the red-breasted and pygmy nuthatches (Marshall et al. 2003). They use cavities excavated by woodpeckers or those formed by decay in both live and dead trees for nesting and roosting, but nest primarily in live trees (Marshall et al. 2003). All species are closely associated with mature or old growth ponderosa pine forests but may be found in mixed conifer forests dominated by ponderosa pine. Pygmy and white-breasted nuthatches excavate their own cavities. Nuthatches forage on the outer branches in the upper canopy on needle clusters, cones, and emerging shoots with some limited foraging on bark. (Marshall et al. 2003). Risks to these species include loss of mature ponderosa pine forests, fire suppression resulting in overstocked stands and reduced snag recruitment, salvage logging, and chemical use (Marshall et al. 2003).

The chipping sparrow is an uncommon to common summer resident preferring open habitats with a shrub or grass component. Chipping sparrows prefer open coniferous forests or stands of trees interspersed with grassy openings or low foliage (Marshall et al. 2003 pp. 538-540). In central Oregon, good numbers of chipping sparrows can be found in juniper, ponderosa pine, and lodgepole pine communities but are not present in sagebrush (Marshall et al. 2003 pp. 540-542). This sparrow breeds in scattered locations in the Cascades and throughout higher elevations of eastern Oregon. The diet of this sparrow is not well known. A study conducted for central Oregon (Eastman 1960 in Marshall et al. 2003) shows a preference for weed seeds. Declines in populations have been noted from Breeding Bird Survey (BBS) results (1966-2000) for the chipping sparrow showing a 3.9% decrease per year. Some reasons for this decline includes habitat changes due to fire suppression resulting in closed canopy habitat, cowbird parasitism, and competition with house sparrows and house finches.

The conservation status based on the Nature Serve ranking indicate the pygmy nuthatch and white-breasted is secure at globally, nationally, and state wide. (USFS 2012)

The conservation status based on the Nature Serve ranking indicate the red-breasted nuthatch is secure at globally, nationally, and state wide. (USFS 2012)

The conservation status based on the Nature Serve ranking indicate the chipping sparrow is ranked as Least Concern globally, nationally, and state wide.

Habitat for these species occurs throughout the Deschutes National Forest. Approximately 316 acres of habitat exists within the project area. Approximately 1,272 acres of habitat occurs within the watershed and approximately 243,364 acres of habitat occurs across the Deschutes National Forest. Table 19 summarizes these acreages:

Table 19: Habitat for these species within the Melvin Butte project area, the watershed, and across the Deschutes National Forest

Acres of Habitat in the Melvin Butte Project Area	Acres of Habitat in the Watershed	Acres of Habitat Across the Deschutes National Forest
316 acres	1,272 acres	243,364 acres

Measure: Acres of suitable reproductive habitat affected for the Nuthatches, and chipping sparrow.

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

The ecological trend is that snag habitat would continue to be provided in the short and long-term. Previously treated stands would continue to grow providing future late-structural habitat. Untreated dense stands would continue to see increased snag recruitment through tree mortality from natural disturbances such wildfire, wind events, insect and disease pathogens, and lightning. High tree density in some of the ponderosa pine and mixed conifer stands would not only retard the development of large diameter (>21") ponderosa pine and white-fir trees and future snags but also may hasten the development of smaller diameter snags and coarse woody material as a result of mortality from bark beetles, disease, or fire. Large snags and downed logs would continue to be limited for the nuthatches. The increased fire risk would also put these limited habitat features at risk. If a high intensity wildfire burns through the planning area, habitat for many of these species would be lost.

Habitat for species that are more dependent on closed canopies and dense understories (i.e. red-breasted nuthatch) will continue to increase over time. At higher elevations white-fir will continue to out compete ponderosa pine resulting in increased stand densities and loss of late successional conditions over time. This will eventually result in fewer large snags and down woody material on the landscape and fewer nesting sites. Loss of ponderosa pine results in fewer foraging opportunities for species like the pygmy nuthatch that need large diameter trees. Increased stand densities and brush densities increases the risk of loss which could further reduce the availability of habitat in the area for most late successional species. Increased stand densities is a major factor in the decline of chipping sparrow habitat, which can be directly tied to fire suppression over the last 100 years. Stand densification as a result of no action would continue to be a factor in habitat loss.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Prescribed Burning (B) Non-commercial Thinning (P) and Scenic Views Enhancement

Thinning from below (HTH) will occur within both second growth "black bark" ponderosa pine stands as well as multi-storied ponderosa pine stands containing old growth. Within black bark pine stands thinning will promote heterogeneity by mosaic thinning. Thinning will occur on trees >8 inches dbh retaining the largest and healthiest trees in the stands. The objective of mosaic thinning is to try to replicate how the stand would be spatially arranged under natural fire scenarios, creating skips, gap, and small clumps of

unthinned trees. Within multi-storied stands, thinning from below will occur, reducing ladder fuels to the overstory, reducing the competition for resources promoting the longevity of the old growth in the stand. Small diameter trees with old growth form will be retained. Treatment objectives will retain LOS characteristics in the stand, but also continuing to recruit large trees into the overstory perpetuating old growth ponderosa pine habitat. Non-commercial thinning treatments will primarily remove material <8"dbh and in some cases up to 12" dbh material in advanced regeneration plantations.

Within the Scenic View treatment, the primary objective is to reduce the fuel loading associated with stand replacing mortality from the Pole Creek Fire. These stands will remove fuel concentration to meet the Scenic Views objective in the Deschutes Forest Plan. Treatments will retain individual snags throughout the corridor primarily removing pockets of burned lodgepole pine. No green trees will be removed from this project.

The objective of prescribed fire is to reduce fuel loading by using prescribed fire to create a continuous mosaic of burned and unburned habitat. Treatments may unintentionally burn existing snags, however new snags could also be recruited through this process. Mortality of snags in ponderosa pine habitat during prescribed fire treatments in Arizona and California ranged from 20% (Randall-Parker and Miller 2002), 45% (Horton and Mannan 1988), and 56% (Bagne et al. 2008). All three studies found that larger diameter ponderosa pine trees were least likely to die, at least in the short-term. Horton and Mannan (1988) found a 20-fold increase in abundance of snags < 15 cm dbh. Several studies showed that the highest snag losses were in areas where a long period of fire exclusion had occurred (Bagne et al. 1988, Holden et al. 2006). Bagne et al. (2008) and Horton and Mannan (1988) found that re-entry burns had a much lower mortality rate for snags, presumably because the trees that did not burn during the first entry were more resilient. Loss of snags from prescribed fire was partially mitigated by the creation of new snags (Horton and Mannan 1988, Bagne et al. 2008).

Table 20 summarizes the amount of habitat associated with treatments under each action alternative for the Melvin Butte project.

Table 20: Total Acres of Habitat Associated with each Treatment Type by Alternative

Treatment Type	**Alternative 2**	**Alternative 3**
B	83	83
HTH	29	34
P	151	151
Scenic Views Enhancement	39	39
Total Acres.	**302**	**307**

Overall, approximately 302 acres of habitat are associated with treatments identified under Alternative 2 and approximately 307 acres under Alternative 3.

Within ponderosa pine and mixed conifer stands dominated by ponderosa pine overstory structural diversity will remain, but understory complexity will be reduced through follow up treatments to deal with slash generated for activities such as mowing, and burning. Fuels treatments associated with harvest treatments could potentially be beneficial as treatments reduce understory complexity, promoting a more herbaceous understory increasing an insect prey base. Although foraging habitat will be reduced in the short-term, for species such as the chipping sparrow through the removal of regenerating pines in the understory, some residual habitat will remain providing foraging opportunities. Since treatments are primarily thinning from below, habitat for the nuthatches will be retained. Although overall stand densities will be reduced, fully stocked over-story stands will remain post-treatment, continuing to provide foraging opportunities. Long-term benefits of treatments will be a reduction of stress to the overstory promoting the longevity of large tree structure and the limited residual old growth, but also promoting the development of future old growth in the stand that will provide long-term reproductive habitat.

Similarly, in PCT units within ponderosa pine containing advanced regeneration, treatment will reduce some foraging habitat but will not remove any residual large trees. These stands are very homogenous and overstocked, and treatments will promote stand heterogeneity through variable density thinning. Treatment will accelerate the development of large tree structure promoting the development of future nesting and foraging habitat for all these species, but could remove some foraging habitat for the chipping sparrow and white-breasted nuthatch the use younger stands for foraging habitat in the short-term.

In the long-term, treatments associated with Alternative 2 and 3 are the most proactive in promoting the development of more fire resistant stands.

See Decaid Snag and Log Analysis for the projects effect to dead wood habitat and distribution.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Tables 1 were reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to pygmy nuthatch, white-breasted nuthatch, and chipping sparrow. The Deep Canyon watersheds will be used to discuss cumulative impacts to these species.

Three large wildfires have occurred within the Deep Canyon Watersheds – Rooster Rock (2010), Pole Creek (2012), and Two Bulls (2014). Approximately 54 acres of ongoing salvage is occurring within the Pole Creek Fire as well as the site specific salvage of fire killed danger trees along major routes. The BFR is proposing 250 acres of fire salvage associated with the Two Bulls Fire. These two fire salvage project are removing fire killed trees from stand replacing fire area. These areas did not provide habitat for the pygmy nuthatch, white-breasted nuthatch, or chipping sparrow.

Activities proposed under the Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood project have occurred or may occur in suitable habitat. The Bear Wallow and Bend Municipal Watershed Hazardous Fuels reduction projects focus primarily on removing dead lodgepole pine among green stands to reduce fuel loading. The majority of the activity would occur in lodgepole pine habitat but some occurs in mixed conifer. The Ursus project primarily occurs in mixed conifer habitat and focuses on retaining and promoting ponderosa pine in mixed conifer stands. The project focuses on thinning stands from below to restore and enhance ponderosa pine and mixed conifer stands while reducing the risk of stand replacing fires. Treatments proposed will reduce the risk of loss of existing nesting and foraging habitat from future large-scale disturbances. Overall, these projects primarily occur in approximately 7,060 acres of mixed conifer and lodgepole pine habitat types within the Deep Canyon watershed. These plant association groups do not provide highly suitable habitat for these species and therefore will minimally degrade habitat.

Private lands are not managed for habitat. Therefore, it is assumed that any habitat provided by private timberland in the watershed is incidental and may not be long term.

Of the 316 acres of reproductive habitat identified within the project area, Alternative 2 treatments are associated with approximately 302 acres of reproductive habitat and approximately 307 acres under Alternative 3.

Of the 1,272 acres of reproductive habitat within the Watershed, cumulatively Alternatives 2 and 3 are associated with approximately 23% of the total habitat.

The two alternatives will thin, mow and burn approximately <1% of the total habitat across the Deschutes National Forest.

Conclusions

Treatments associated with the ponderosa pine PAG propose thinning from below, promoting the development of contiguous stands of late and old structure habitat that these species need for nesting and foraging. However, through project design c, treatments have been designed to maintain untreated stands throughout the project providing small tree diversity that could also provide foraging opportunities.

Overall, implementation of the action alternatives as well as other projects across the district should result in improved habitat conditions for those species dependent on large ponderosa pine habitat which could lead, to increased populations. Cumulatively there will be a decrease in dense understory habitat; these changes will result in more sustainable habitat conditions across the landscape and move habitat conditions closer to historical conditions. Fire suppression has created denser conditions than historically occurred which resulted in an increase in dense habitat species and a decline in open pine habitat species. Some snag habitat will be lost, however measures are in place to minimize effects.

Although treatments will thin stands that are currently suitable reproductive habitat, the Melvin Butte project will not contribute to a change in viability for the species within the Watershed or on the Deschutes National Forest for these species.

Conclusion

Cumulatively, with the ongoing forest management projects within the Deep Canyon Watershed none of the projects propose to remove large snags or LOS habitat types. There will be less than a 1% of the overall habitat associated with treatments across the Deschutes National Forest. Implementation of this project will not contribute to a change in viability for these species on the Deschutes National Forest.

Landbird Conservation Strategy Consistency

Biological objectives are all based on "where ecologically appropriate" meaning actions must occur within the proper habitat addressed in order to be consistent or not.

Species	Biological Objectives	Consistent Yes, No, or NA	Rationale
In Ponderosa Pine Stands and Mixed Conifer Dominated by Ponderosa Pine: **Pygmy Nuthatch** **Chipping Sparrow**	PYGMY NUTHATCH		
	Provide a mean of 10 trees/acre >21"dbh and at least 2 trees >31"dbh	Yes	Treatment will not target large ponderosa pine except where diseased trees are hindering the development of future Late and Old Structure stands. In such a case sufficient large trees will be left to me this objective.
Other species to benefit from objectives: White-breasted Nuthatch, Red-breasted nuthatch	Provide a mean of 1.4 snags/acre >8"dbh with 50% >25"dbh in a moderate to advanced state of decay	Yes	Due to the amount of mortality within the watershed sufficient snags will exist to meet this requirement as well as those retained in the project area.
	CHIPPING SPARROW		
	Interspersion of herbaceous	Yes	Within the low elevation

	ground cover w/shrub and regen pine patches		ponderosa pine PAG and mid elevation ponderosa pine and mixed conifer dry PAG 10-20% of the project area associated with each PAG will be left in untreated patches as well as entire stands containing habitat
	20-60% cover in shrubs (including small trees) and >20% of shrub layer in regen saplings conifers, mean canopy cover 10-30%	Yes	Within the low elevation ponderosa pine PAG and mid elevation ponderosa pine and mixed conifer dry PAG 10-20% of the project area associated with each PAG will be left in untreated patches as well as entire stands containing habitat
	Ensure a mix of understory conditions such that 10 to 30% of the landscape meets site level conditions as describe above	Yes	10 to 20% of the project area will be retained in untreated stands and will meet site level conditions as described

Mitigation Measures: None

Recommendations:

1. To avoid potential nest destruction and loss of broods, schedule harvest and post harvest activities outside of nesting season in appropriate habitat (March 15 through June 30).

Mixed Conifer, Edges and Openings Created by Wildfire – Olive-sided Flycatcher and Hairy Woodpecker

Existing Condition

The olive-sided flycatcher is a summer resident that breeds in low densities throughout coniferous forests of Oregon. The hairy woodpecker is a resident in forests throughout Oregon except for juniper. The olive-sided flycatcher, an aerial insectivore, prefers forest openings or edge habitats where forest meets meadows, harvest units, rivers, bogs, marshes etc. (Marshall et al. 2003). Similar to the flycatcher, the hairy woodpecker is found primarily in mixed conifer and ponderosa pine forests adjacent to deciduous stands but is most common in burns or areas infested with mountain pine beetles (Marshall et al. 2003). There is some preference for older stands for the hairy woodpecker and where old trees are absent, they prefer thinned stands. Nesting success for the flycatcher was highest within forest burns where snags and scattered tall, live trees remain (Marshall et al. 2003 and Wisdom et al. 2000 p. 215). Common features of nesting habitat include tall prominent trees and snags used as foraging and singing perches. The flycatcher forages from high prominent perches at the tops of snags or from the uppermost branches of

live trees and needs unobstructed air space to forage. It preys on flying insects and in particular, bees and wasps. (Marshall et al. 2003 pp. 374-375). The hairy woodpecker nests in dead trees with light to moderate decay and their diet consists of beetles, ants, spiders, and other insects (Marshall et al. 2003).

Population trends based on BBS data show highly significant declines with an Oregon statewide decline of 5.1% per year from 1966-1996 for the olive-sided flycatcher. Factors potentially contributing to population declines on breeding grounds include habitat loss through logging, alteration of habitat through management activities (e.g., clearcutting, fire suppression), and lack of food resources. (Marshall et al. 2003 p. 376). Wisdom et al. (2000 p. 218) also noted that where altered fire regimes result in fewer but larger fires, the juxtaposition of early and late seral habitats becomes less favorable. However, the Columbia Basin (Southern Cascades) shows increases of >60% for the olive-sided flycatcher compared to other areas. BBS data (1966-2000) for Oregon show no significant decline for the hairy woodpecker (0.5% decline per year).

The conservation status based on the Nature Serve ranking indicates the hairy woodpecker is secure globally, nationally, and state wide. (USFS 2012)

The conservation status based on the Nature Serve ranking indicates the olive-sided flycatcher is near threatened, through the International Union for Conservation of Nature (IUCN) Red List of threatened species.

Habitat for the olive-sided flycatcher and hairy woodpecker occurs throughout the Deschutes National Forest. Through the Forest wide assessment completed for MIS, hairy woodpecker reproductive habitat was mapped across the entire Deschutes National Forest and will be used as a surrogate for the olive-sided flycatcher. Approximately 1,398 acres of habitat exists within the project area. Approximately 4,517 acres habitat occurs within the Watershed and approximately 507,920 acres of habitat occurs across the Deschutes National Forest. Table 21 summarizes these acreages:

Table 21: Habitat for the Olive-sided Flycatcher and Hair Woodpecker within the Melvin Butte Project Area, Watershed, and Across the Deschutes National Forest

Acres of Habitat in the Melvin Butte Project Area	Acres of Habitat in the Watershed	Acres of Habitat Across the Deschutes National Forest
1,398 acres	4,517 acres	507,920 acres

For the detailed assessment on the hairy woodpecker for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measure: Acres of suitable habitat affected for olive-side flycatcher and hairy woodpecker.

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

Overtime, stocking density in suitable habitat would continue to increase, thus decreasing natural openings and associated habitat components needed by the olive-sided flycatcher and hairy woodpecker. Existing dense stands would continue to fall apart due to tree mortality, creating openings which may provide future habitat. This alternative would leave the stands in a dense condition, making them susceptible to fire, which could benefit the hair woodpecker by providing early post-fire habitat it needs. However, the olive-sided flycatcher needs a mosaic of burned and unburned habitat and there is a risk that

green trees would not be left due to the intensity of the fire. Approximately, 40% of the Sisters Ranger District has been impacted by wildfire over that past 15 years, which the majority of the wildfires have occurred in the mixed conifer plant association group. In the short-term the hairy woodpecker has benefited from the pulses of high quality foraging habitat that the burned forest provides. However, within five years post fire the majority of the insect activity subsides and foraging greatly diminishes. Although the dead trees provide nesting habitat, hair woodpecker densities greatly diminish in these post fire habitats due to the lack of foraging opportunities.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Mixed Conifer Thinning with Group Openings (MCGO), Mixed Conifer Thinning without Group Openings (MC-without openings), Non-commercial Thinning (P), Prescribed Burning (B) and Scenic Views Enhancement.

Commercial thinning (HTH) and Mixed Conifer Thinning with and without group openings (MCGO and MC - without openings) will consist of primarily thinning from below removing trees >8"dbh. Treatments will focus on maintaining the overstory trees in pure ponderosa pine and mixed conifer stands providing overstory large tree structure for both olive-sided fly catcher and hairy woodpecker. Treatments will retain and promote the development of overstory ponderosa pine reducing site competition. Within mixed conifer treatments these stands are dominated by small trees and will focus on reducing stand densities primarily removing second growth lodgepole pine and white-fir, favoring healthy white-fir and ponderosa pine. This treatment will result in the accelerated growth of residual trees while reducing the fire hazard. Long-term beneficial impacts of small tree thinning will be the reduction of habitat fragmentation by promoting the development of LOS habitat which includes large snags at an accelerated rate which will promote nesting habitat for both olive-side flycatcher and hairy woodpecker. Short-term beneficial impacts will be seen in the reduction of risk to existing suitable habitat to olive-sided flycatcher and hair woodpecker. This treatment will beneficial to the both species by creating large snags over the long-term to be utilized as nesting and beneficial to hairy woodpecker for foraging habitat. In addition, with Mixed Conifer Thinning with group opening, small group opening of approximately 1-3 acres in size will be created. This will beneficial to olive-sided flycatcher by creating small opening and associated edge for foraging on the wing. In addition, isolated large snags adjacent to the opening will provide highly suitable nesting habitat for the olive-sided flycatcher.

Non-commercial thinning (P) will occur within ponderosa pine plantations that are approximately 20 to 40 years old. Treatments will consist of removing material primarily <8"dbh and occasionally up to 12" dbh material in advanced regeneration plantations. These plantations do not provide high quality habitat for the hairy woodpecker or olive sided flycatcher. However, due to overstocking isolated pockets of insect out breaks occur in these stands providing some foraging habitat. In addition, small pockets of small snags (approximately 1/2 acre to 1 acre in size) also occur providing some nesting opportunities. In the long-term, thinning will reduce stand densities promoting the development of LOS ponderosa pine, recruiting large snags and creating more highly suitable reproductive habitat in these area.

Scenic Views Enhancement was developed to meet the scenic views Forest Plan standards and guides for the 16 road corridor. Treatments will remove small dense patches of fire killed trees to enhance the visual quality of the foreground. Small diameter fire killed trees are the focus, retaining all live trees and large snags to benefit scenic quality and maintain existing habitat. Treatment will not reduce reproductive habitat, however will minimally reduce some foraging habitat for both species by removing dense pockets of small fire killed trees.

The objective of prescribed fire is to reduce fuel loading by using prescribed fire to create a continuous mosaic of burned and unburned habitat. Treatments may unintentionally burn existing snags, however new snags could also be recruited through this process. Mortality of snags in ponderosa pine habitat

during prescribed fire treatments in Arizona and California ranged from 20% (Randall-Parker and Miller 2002), 45% (Horton and Mannan 1988), and 56% (Bagne et al. 2008). All three studies found that larger diameter ponderosa pine trees were least likely to die, at least in the short-term. Horton and Mannan (1988) found a 20-fold increase in abundance of snags < 15 cm dbh. Several studies showed that the highest snag losses were in areas where a long period of fire exclusion had occurred (Bagne et al. 1988, Holden et al. 2006). Bagne et al. (2008) and Horton and Mannan (1988) found that re-entry burns had a much lower mortality rate for snags, presumably because the trees that did not burn during the first entry were more resilient. Loss of snags from prescribed fire was partially mitigated by the creation of new snags (Horton and Mannan 1988, Bagne et al. 2008). This treatment would be beneficial to both olive-sided flycatcher and hairy woodpecker. Treatments will create a mosaic of green and dead trees providing both foraging and nesting opportunities for both species.

Table 22 summarizes the amount of habitat associated with treatments under each action alternative for the Melvin Butte project.

Table 22: Total Acres of Olive-sided Flycatcher and Hairy Woodpecker Habitat Associated with each Treatment Type by Alternative.

Treatment Type	Alternative 2	Alternative 3
B	253	253
HTH	310	336
MC – No Group Opening	-	36
LPI	27	27
MCGO	36	-
P	493	493
Scenic Views Enhancement	41	41
Total Acres.	**1,160**	**1,186**

Overall, approximately 1,160 acres of habitat are associated with treatments identified under Alternative 2, and approximately 1,186 acres under Alternative 3. Alternative 2 is the most proactive on the landscape; this alternative does the best job at breaking up fuel continuity and maintaining large tree habitat adjacent to forest edges.

Overall, implementation of the action alternatives will maintain existing habitat conditions for olive-sided flycatcher and hairy woodpecker by maintaining and enhancing the development of large tree structure across the project area. Treatments reduce the risk of losing existing habitat to stand replacing fire. Under Alternative 2, through thinning, small openings will create and provide some edge habitat while retaining a fully stocked overstory for perch trees. Treatments will not preclude use of the project area by the olive-sided flycatcher and hairy woodpecker. These changes will result in more sustainable habitat conditions across the landscape and move habitat conditions closer to historical conditions. Fire suppression has created denser conditions than historically occurred which resulted in an increase in dense habitat species and a decline in open pine habitat species.

See DecAID Snag and Log Analysis for the projects effect to dead wood habitat and distribution.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Tables 1 (cumulative effect table for wildlife) was reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to the hairy woodpecker, or olive-sided fly catcher reproductive habitat. The Deep Canyon Watershed is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Three large wildfires have occurred within or partially within the Deep Canyon watershed –Rooster Rock (2010), Pole Creek (2012), and Two Bulls Fire (2014). Approximately 54 acres of the Pole Creek Salvage are ongoing and approximately 250 acre is being proposed to salvage associated with the Two Bulls Fire. Danger tree removal occurred on all the fires mentioned above to varying degrees resulting in a reduction of potential nest sites in stand replacement areas along main roads. Fire salvage directly impacts hairy woodpecker nesting and foraging habitat by removing fire killed that provide high quality foraging habitat in the first 5 years post fire while bark beetles are highly active as well as removing suitable nest snags. Fire salvage can also remove suitable nesting habitat for olive-sided flycatcher, when snags are removed along edge habitat directly adjacent to green unburned forests.

Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood projects have occurred or may occur in suitable habitat. These projects focus primarily on removing dead lodgepole pine among green stands to reduce fuel loading, some of the activity are also associated with mixed conifer habitat. Overall, treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances. There are approximately 7,060 acres associated with these projects, within the Deep Canyon watershed. Treatment within these area focus primarily on reducing stand densities by thinning from below and removing concentration of dead lodgepole pine from bark beetle outbreaks. Treatments in these project areas could reduce hairy woodpecker habitat by removing dead and dying lodgepole pine that provide both foraging and nesting opportunities. Where these project thin around large green ponderosa pine and large ponderosa pine snags, treatments will be beneficial to nesting and foraging habitat for the olive-sided flycatcher.

Overall, implementation of the action alternatives as well as other projects within the watershed should result in improved habitat conditions for those species dependent on open canopy forest habitats which could lead, over time, to increased populations. Cumulatively there will be a decrease in dense understory habitat; these changes will result in more sustainable habitat conditions across the landscape and move habitat conditions closer to historical conditions.

Conclusion

Cumulatively, with the ongoing forest management projects within the Deep Canyon watershed, none of the projects propose to remove large snags within the mixed conifer and ponderosa pine habitat types except any posing hazard to operations under OSHA guidelines. Because this project impacts less than 1% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of hairy woodpecker is expected on the Deschutes National Forest.

Landbird Conservation Strategy Consistency

Biological objectives are all based on "where ecologically appropriate" meaning actions must occur within the proper habitat addressed in order to be consistent or not.

Species	Objective	Do Not Meet, Meets, Not Applicable	Rationale
Olive-sided Flycatcher **Other species to benefit from objectives:**	Where ecologically appropriate in mixed conifer through natural events or management maintain: >2% of landscape as post-fire habitat	Not applicable	This is not a post fire salvage project.
	Where ecologically appropriate	Not applicable	The project is not a fire

Hairy Woodpecker	in mixed conifer through natural events or management maintain: >40% of the post fire landscape as unsalvaged.		salvage project.
	Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: in burns >100 acres, salvage <50% of standing dead and down	Not applicable	The project is not a fire salvage project.
	Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: retain all trees/snags >20"dbh and >50% of those 12-20"dbh	Not applicable	The project is not a fire salvage project.
	Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: retain all trees/snags >20"dbh and >50% of those 12-20"dbh	Not applicable	The project is not a fire salvage project.
	Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: patches with a mix of live and dead trees/snags to provide potential nesting trees in context of potential foraging and perch trees	Not applicable	The project is not a fire salvage project.

Mitigation Measures: None

Recommendations:

1. To avoid potential nest destruction and loss of broods, schedule harvest and post harvest activities outside of nesting season in appropriate habitat (March 15 through June 30).

Mixed Conifer, Large Trees and Snags –Pileated Woodpecker, Brown Creeper, Hermit Thrush, Flammulated Owl, and Williamson's Sapsucker

Existing Condition

The brown creeper is the only North American bird that relies on both the trunk and bark of trees for nesting and foraging. The pileated woodpecker is limited attitudinally by habitat availability as the higher and lower elevations lack enough large trees for nesting, roosting and foraging. The brown creeper is found predominantly in coniferous forests but can be located in hardwood stands as well. Pileated woodpeckers occur primarily in dense mixed conifer forests in late seral stages and are rarely found in pure ponderosa pine stands. Brown creepers nest under loose, sloughing bark of large diameter snags with little to moderate decay. The mean diameter of nest trees range from 16" dbh to 42" dbh. In

northeastern Oregon, creeper abundance was positively associated with the height of the canopy and density of trees. (Marshall et al. 2003 pp.453-456). Adams and Morrison (1993) found similar results with creepers being highly correlated with mature-aged stands with moderate overall stand density.

Pileated woodpeckers need large diameter snags or live trees with decay for nesting and roosting sites, large diameter logs for foraging on ants and other arthropods, and dense canopy to provide cover. Creepers seem to be fairly common but forest management practices, especially the loss of large diameter snags and live trees, may cause a threat to this species. BBS data (1966-1991) for the pileated woodpecker shows no significant change. Risks include activities that eliminate or reduce the number of snags, logs, and cover. In addition, conversion of fir stands to pure ponderosa pine reduces suitable habitat. (Marshall et al. 2003).

The hermit thrush is an uncommon to common summer resident preferring mid to high elevation mature and old growth forests at mid to high elevations. The hermit thrush breeds in mature forests of all types especially those with a shaded understory of brush and small trees ranging from aspen groves to juniper woodlands to moderately open coniferous forests. Higher densities of hermit thrushes have been reported in old-growth riparian stands relative to other mature and young riparian stands. The hermit thrush nests on the ground or use small trees in the understory. They are ground foragers of insects; however fruits and berries may also be consumed especially during migration and in winter. Populations seem to be stable at this time. Microsites selected for foraging tend to have little to no vegetation or litter. Threats to the hermit thrush include the loss of mature forests and controlled burning of forest understories, especially spring burning. Hermit thrush responses have been known to decrease after fires (Sallabanks 1995). (Marshall et al. 2003 pp. 483-485 and 487-489).

Williamson's sapsuckers are highly adaptable and are able to withstand considerable disturbance. Populations seem to be fairly stable however, snag removal remains the primary threat for this species (Marshall et al. 2003). Williamson's sapsuckers are weak excavators and select for the soft and decayed wood for nest sites regardless of tree species (Marshall et al. 2003). Williamson's sapsuckers are summer residents east of the crest and are most often found in ponderosa pine during the breeding season (Marshall et al. 2003). However, east of the cascade the majority of mixed conifer forests are ponderosa pine dominated, and the Williamson's sapsucker is dependent on large ponderosa pine snags for nesting.

Flammulated owl habitat also includes dense patches of saplings or shrubs used for roosting. The flammulated owl forages exclusively at night primarily for nocturnal arthropods (USDA 1994b). Little is known on the population status of the flammulated owl to indicate significant population declines (Marshall et al. 2003).The flammulated owl is unique in the Pacific Northwest. It preys almost exclusively on insects and is a neotropical migrant. The flammulated owl and Williamson's sapsucker breed on the eastern slope of the Cascades and are found in mature to old growth forests with limited understories at mid to high elevations (Marshall et al. 2003).

The project area contains mixed conifer habitat containing the large tree structure needed by these species. However, due to the small size of the project and proposed treatments there is limited effects to habitat as a result of proposed treatments.

The conservation status based on the Nature Serve ranking indicate the pileated woodpecker is secure globally, nationally, and state wide. (USFS 2012)

The conservation status based on Nature Serve ranking indicates the brown creeper, flammulated owl, and hermit thrush are "least concern" for these species.

The conservation status based on the Nature Serve ranking indicate the Williamson's sapsucker is secure at globally, nationally, and state wide. (USFS 2012)

Through the Forest wide assessment completed for MIS, pileated woodpecker reproductive habitat was mapped across the entire Deschutes National Forest and will be used as a surrogate for the brown creeper,

hermit thrush, Williamson's sapsucker, and flammulated owl. Approximately 1,216 acres of habitat exists within the project area. Cumulatively, approximately 4,890 acres habitat occurs within the Watershed and approximately 243,364 acres of habitat occurs across the Deschutes National Forest.

Table 23 summarizes these acreages:

Table 23: Habitat within the Melvin Butte Project Area, Watershed, and Across the Deschutes National Forest.

Acres of Habitat in the Melvin Butte Project Area	Acres of Habitat in the Watershed	Acres of Habitat Across the Deschutes National Forest
1,216 acres	4,890 acres	243,364 acres

For the detailed assessment on the pileated woodpecker for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measure: Acres of suitable habitat affected for pileated woodpecker, brown creeper, hermit thrush, flammulated owl, and Williamson's sapsucker.

Environmental Consequences

Alternative 1 – No Action – Existing Ecological Trend

Under the No Action stand densities would increase and perpetuate the loss of large structure over time, which these species require for suitable nesting and foraging habitat. In dense stands, increased competition for nutrients will prolong the development of large trees. Nest site availability for the pileated woodpecker, brown creeper, hermit thrush, and flammulated owl will be limited, increasing competition for existing sites leading to greater predation risks. Increased stand densities may increase the risk of loss from fire.

The Williamson's sapsucker would see a decrease over-time as stands begin to deteriorate; this species is a weak excavator and feeds on sap wells of smaller diameter trees but utilizes large snags for nesting. Dense stands of large and small diameter green trees would deteriorate in the short-term. Due to stand densities very few large trees would develop over the long-term and large snags for nesting would be limited in the project area.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Mixed Conifer Thinning From Below with and without Group Openings (MCGO and MC-without openings), Lodgepole Improvement (LPI), Scenic Views Enhancement

There are no known direct impacts to any of the above listed species as a result of any action alternatives. However, indirect impacts exist from the removal of green trees 21 inches and greater associated with thinning from below in mixed conifer/ponderosa pine (HTH, MCGO, and MC-without openings). Large trees identified for removal in these treatment types will primarily be white-fir that are competing with large diameter ponderosa pine for nutrients or are creating ladder fuels to overstory ponderosa pine. Treatments will also reduce habitat by removing overstory white-fir to break up fuel continuity in mixed conifer stands, the average diameter for removal is 14 inches dbh in these stands. Do to the fiberous nature of white-fir and how quickly it decays it tends to be a species that is commonly observed being

excavated by pileated woodpecker on the district and provides nesting, roosting, and foraging habitat for the other previously mentioned species. Although treatments will favor ponderosa pine, residual white-fir will remain as clumps and individual trees in areas they are not competing with overstory ponderosa pine. In addition large snags are not targeted for removal, but there is a possibility for incidental loss of snags during treatments. Generally, snags would be avoided during treatments, but incidental removal would occur, as OSHA regulations require removal of snags that pose hazard to operations.

The LPI treatments will also treat some deteriorating white-fir. Treatments are focused on removing unhealthy lodgpole pine from stands to reduce beetle mortality to green stands and promote residual tree vigor. Although treatments will remove commercial size trees they will primarily be smaller diameter trees, therefore some minor impacts to reproductive habitat is expected. Minimal effects are anticipated due to the limited amount of habitat associated with this treatment type.

Prescribed burning would also occur. In the short-term these treatments will reduce both activity fuels and overall fuel loadings to acceptable levels. Fuel treatments will reduce fire risk and will reduce competition to established trees, increasing the stands resiliency to wildfire. The objective is to create a mosaic of burned and unburned areas, creating a discontinuous distribution of fuel throughout the project areas. Due to the removal of shrubs from prescribed burning this treatment has the potential to reduce reproductive habitat for the hermit thrush. However, fuels treatments could also enhance flammulated owl foraging habitat by promoting grass/forb/shrub complexities which will increase insect production over the long-term.

The Scenic Views Enhancement treatment was developed to meet Scenic Views objectives associated with the 16 road corridor. As a result of the Pole Creek Fire this area received stand replacing fire, to meet forest plan standards and guides, areas containing high densities of small dead trees will be removed to enhance scenic quality. All green trees and large snags that contribute to visual quality will be retained. This treatment will not likely reduce reproductive habitat or future habitat since all green trees and large snags will exist post treatment.

In the remaining 45% of untreated habitat, there will continue to be an increased risk from disturbance, although breaking up the fuel continuity across the landscape will reduce the risk of a large scale disturbance event. In addition some of the areas identified for no treatment occur within higher site potential areas (i.e Riparian Reserves); these sites are capable of producing large trees with greater canopy closure and are directly adjacent to the areas that are currently suitable habitat. These areas have the potential to provide habitat.

Table 24 summarizes the amount of habitat associated with treatments under each action alternative for the Melvin Butte project.

Table 24: Total Acres of Reproductive Habitat Associated with each Treatment Type by Alternative for the Melvin Butte Project.

Treatment Type	**Alternative 2**	**Alternative 3**
B	278	278
HTH	357	417
MC – No Group Opening	-	52
LPI	18	18
MCGO	53	-
Scenic Views Enhancement	60	60
Total Acres	**766**	**825**

Overall, approximately 766 acres of habitat are associated with treatments identified under Alternative 2 and approximately 825 acres associated with Alternative 3. These areas are primarily multi-storied stands dominated by large trees.

In areas identified for thinning, canopies will be opened up and stand densities reduced to lessen the risk of a large-scale event (insects, disease, or fire). Thinning will directly reduce canopy cover, but it will also reduce the fire risk to individual stands by breaking up the fuel continuity, reducing the risk of larger scale disturbance events. Approximately 65% of the identified habitat is associated with vegetation treatments. However, treatments do not propose to remove large trees and snag that are important habitat components to these species. Treatment will not preclude use of habitat by these species. Overall, the treatments described above will aid in the development of a more resilient landscape as well as habitat to disturbance.

See DecAID Snag and Log Analysis for the projects effect to dead wood habitat and distribution.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Table 1 were reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to the cavity nesters that utilize mixed conifer habitat with large trees and snags. The Deep Canyon watershed will be used to discuss cumulative impacts to these species.

Three large wildfires have occurred within the Deep Canyon Watershed –Rooster Rock (2010), Pole Creek (2012), and Two Bulls Fires (2014). Approximately 54 acres of salvage logging are ongoing within the Pole Creek Fire and approximately 250 acres of salvage logging is being proposed within the Two Bull Fire. Danger tree removal has occurred or will occur on all the fires mentioned above to varying degrees resulting in a reduction of potential nest sites in stand replacement areas along main roads. Creating areas with limited nesting opportunities.

Activities proposed under the Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood project have occurred or may occur in suitable habitat. The Ursus project, Bend Municipal Watershed Hazardous Fuels reduction project, and Bear Wallow Firewood project all focus primarily on reducing fuel loads by removing dead lodgepole pine and white-fir among green stands, some of the activity could occur in mixed conifer habitat but will primarily occur in lodgepole pine habitat. Overall, treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances. Overall, treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances. There are approximately 7,060 acres associated with these projects, none of these projects propose to remove large snags within mixed conifer.

Treatments associated with the mixed conifer PAG propose thinning from below, promoting the development of contiguous stands of late and old structure habitat that these species need for nesting and foraging. In mixed conifer habitat dominated by ponderosa pine, the project will also manage stands by thinning from below, but will favor the ponderosa pine to develop a more fire resistant stand containing large ponderosa pine as the dominant species. Treatment will maintain large white-fir in the overstory, except where it is the dominant species and then ponderosa pine will be promoted. Through project design criteria, treatments have been designed to maintain untreated stands throughout the project providing small tree diversity that could also provide foraging opportunities for species like these species of birds associated with mixed conifer habitat.

Overall, implementation of the action alternatives as well as other projects across the district should result in improved habitat conditions for these species dependent on large tree mixed conifer habitat. Cumulatively, these project primarily focus on the removal of dense understory stands; they do not propose to removed large snags and trees therefore minimal impacts will occur to habitat associated with

pileated woodpecker, brown creeper, hermit thrush, and flammulated owl and Williamson's sapsucker. However, dead and dying trees in the medium size classes (averaging approximately 12 - 14 inches dbh) will be removed to reduce fuel concentrations, potentially removing some foraging opportunities. Although they are not large snags these medium sized snags do provide some limited nesting opportunities. All projects and associated treatments will maintain healthy ponderosa pine and white-fir, promoting a more fire resilient mixed conifer stand and minimizing the risk of losing more landscape to wildfire, creating unsuitable habitat to the pileated woodpecker, brown creeper, and hermit thrush and Williamson's sapsucker. Large untreated blocks of habitat have been retained throughout the project area to provide habitat connectivity as well as retention of habitat within each treatment unit. The project will promote long-term habitat for these species by reducing the risk of stand replacing fire, and promoting the development of large tree structure in mixed conifer stands.

Although treatments will thin stands that are currently suitable reproductive habitat, the Melvin Butte project does not propose to remove large trees and large snags that is associated with reproductive habitat within the Watershed or on the Deschutes National Forest for the pileated woodpecker, brown creeper, hermit thrush, Williamson's sapsucker, and flammulated owl.

Conclusion

Cumulatively, with the ongoing forest management projects within the Deep Canyon watershed none of the projects propose to remove large trees and snags within the mixed conifer and ponderosa pine habitat types. Although the Melvin Butte project will treat approximately 65% of the suitable reproductive habitat for the pileated woodpecker within the project area, treatment will not target habitat component such as large trees and snags within the project area. The project does not propose to removes stand elements that contribute to reproductive habitat for the pileated woodpecker, the project is associated with 3% of the total suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The changes to habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of the pileated woodpecker is expected on the Deschutes National Forest.

Landbird Conservation Strategy Consistency

Biological objectives are all based on "where ecologically appropriate" meaning actions must occur within the proper habitat addressed in order to be consistent or not.

Species	Objective	Do Not Meet, Meets, Not Applicable	Rationale
	BROWN CREEPER		
Brown Creeper **Hermit Thrush** **Flammulated Owl**	Where ecologically appropriate initiate actions in mixed conifer forests to maintain or provide: blocks of late-successional habitat >75 acres	Meets	The project will be a thin from below. Therefore, the larger trees will remain on the landscape post activity.
Williamson's Sapsucker **Other species to benefit from objectives:**	Where ecologically appropriate initiate actions in mixed conifer forests to maintain or provide: >4	Meets	The project will be a thin from below. Therefore, the larger trees will remain on the landscape post

Pileated Woodpecker	trees/acre >18”dbh with at least 2 trees >24”dbh		activity.
	HERMIT THRUSH		
	Where ecologically appropriate initiate actions in mixed conifer to maintain or provide: patches of forest with multi-layered structure and a dense understory shrub layer	Meets	Patches of mixed conifer will remain untreated. In areas that are proposed for treatment the goal is to move stands towards historical condition.
	FLAMMULATED OWL		
	>10 snags/100 acres, >12in. dbh and >6ft. tall	Yes	No ponderosa pine snags will be targeted for removal in ponderosa pine thinning and Mixed conifer dry thinning
	>20 trees/8 acres, >21 in. dbh to function as recruitment snags	Yes	This project proposes to thin stand from below favoring ponderosa pine >20 in. dbh for retention where it occurs. The exception is ~200 acres of mixed conifer where overstory treatments focus on trees with an average diameter of 14 inches dbh. No large trees exist in these stands.
	WILLIAMSON’S SAPSUCKER		
	1 snag /acre, >18 in. dbh in ponderosa pine	Yes	Within ponderosa pine treatment, the focus will be thinning of green trees, no ponderosa pine snags are targeted for removal
	Mean canopy cover 25-75%	Yes	The project will thin stand from below, residual canopy closures will exist on the low end of the range, except within mixed conifer thinning with group openings. Group opening will occur at a level of 1-3 acres in size and will not exceed 30% of treatment units.

Mitigation Measures: None

Recommendations:

1. To avoid potential nest destruction and loss of broods, schedule harvest and post harvest activities outside of nesting season in appropriate habitat (March 15 through June 30).

Coniferous Forests – Edges – Northern Flicker

Existing Condition

The northern flicker is a common resident throughout Oregon and is encountered in almost any terrestrial habitat. It is generally most abundant in open forests and forest edges adjacent to open country while they tend to avoid dense forest (Marshall et al. 2003). There is some evidence the flicker prefers older mature forests. Reinkensmeyer (2000 in Marshall et al. 2003) noted the preference for old growth versus mid-successional western juniper in central Oregon. Most nests in forested areas are found in older, open forests, along older forest edges, and in large diameter remnant snags (Marshall et al. 2003). They also tend to nest in trees with moderate to heavy decay. The flicker diet consists of ants, beetles, crickets, other insects, fruits, and seeds and they prefer to forage on the ground (Marshall et al. 2003). BBS data (1966-2000) for Oregon show a non-significant decrease of 0.6% per year decline. The flicker requires open space and may gain foraging habitat from human caused changes but the presence of decayed wood is still required. (USFS 2012)

The conservation status based on the Nature Serve ranking indicate the northern flicker is secure globally, nationally, and state wide level. (USFS 2012)

Approximately 365 acres of reproductive habitat exists within the project area. Approximately 3,036 acres of habitat occurs within the Deep Canyon watershed and approximately 219,576 acres of habitat occurs across the Deschutes National Forest. Table 25 summarizes these acreages:

Table 25: Northern Flicker Habitat within the Melvin Butte Project Area, Watershed, and Across the Deschutes National Forest

Acres of Habitat in the Melvin Butte Project Area	Acres of Habitat in the Watershed	Acres of Habitat Across the Deschutes National Forest
365	3,036 acres	219,576 acres

For the detailed assessment on the northern flicker for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measure: Acres of suitable habitat affected for Northern flicker

Environmental Consequences

Alternative 1 – No Action – Existing Ecological Trend

Increased stand densities perpetuates the problem of losing large structure over time from competition and disturbance events, which this species requires for suitable nesting and foraging habitat. It also limits available nest sites, resulting in more competition for existing sites between species. Increased stand densities may increase the risk of loss from fire. This species requires snags for nesting and generally utilizes larger snags associated with older mature forests. In the event of fire existing snags are lost and replaced with hard snags. Currently there are a limited number of large trees available for potential use.

Replacement large trees are a concern. Many of the future habitat trees are within overstocked stands, which will increase the amount of time the trees will take to get to the desired size. In the short-term as over-stocked stands die and openings are created, flicker use could increase, but due to the lack of large trees, the longevity and utility of the small snags that will occur in these stands are limited. Individual large trees which provide potential habitat are surrounded by dense patches of smaller trees with some shrubs in the understory. Competition for nutrients and water makes these trees more susceptible to insects and disease. In addition, large trees within densely stocked stands are more susceptible to wildfire, due to increased fuel loadings and ladder fuels from 100 years of fire suppression. Large trees will continue to be at an increased risk to insect, disease, and wildfire.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH) Mixed Conifer Thinning From Below with and without Group Openings (MCGO and MC-without openings), Non-commercial thinning (PCT) Scenic Views Enhancement.

The northern flicker is a generalist in that it utilizes a variety of habitat types effectively and resides at varying elevations. It nests in mature late structure stands, and forages in open areas that provide insects, seeds, and fruiting plants. Flickers primarily forage on the ground, but will also excavate. Although they are an excavator they typically excavate for nesting. Past regeneration harvest that created large openings provided areas more likely to be utilized by the flicker; however these regeneration harvests are about 40 years old and understory stand densities have grown up and do not provide these open habitat types any longer. The thinning and fuels treatments planned under the action alternatives within both mixed conifer and ponderosa pine are designed to reduce the risk of high intensity wildfires in the short-term. In addition treatments will retain residual late and old structure stand characteristics that exist throughout the project area and promote the development of late and old structured (LOS) habitat throughout the project area in the long-term. Treatments will thin the plantations, opening these areas up for use by the flicker in the short-term, and promote the development of large tree structure in these plantations in the long-term which will recruit large snags to be used as nesting habitat. The action alternative will remove dead and dying trees in mid-seral mixed conifer stands to break of fuel continuity across the project area. Treatment will maintain the largest and healthiest trees in the overstory, continuing to provide large structure to be recruited as nesting habitat and enhance habitat by reducing stand densities to provide better foraging opportunities and access to the forest floor.

With the exception of the occasional felling of snags that may pose a hazard to human safety during thinning operations associated with mature ponderosa pine stands, thinning operations would have no direct effects to snags or coarse woody material habitats. Commercial harvest would directly affect green tree replacements by reducing the number of trees in treatment units. However the units would retain more than sufficient green tree replacements to exceed levels for snag recruitment in the long-term. Thinning would open up areas, and the indirect effects of treatments include healthier stands, but could reduce some foraging opportunities in the short-term. In addition through prescribed burning, there is the potential to recruit overstory snags and down wood in the short-term that could enhance nesting and foraging habitat in mature ponderosa pine stand.

The objective of prescribed fire is to reduce fuel loading by using prescribed fire to create a continuous mosaic of burned and unburned habitat. Mortality of snags in ponderosa pine habitat during prescribed fire treatments in Arizona and California ranged from 20% (Randall-Parker and Miller 2002), 45% (Horton and Mannan 1988), and 56% (Bagne et al. 2008). All three studies found that larger diameter ponderosa pine trees were least likely to die, at least in the short-term. Horton and Mannan (1988) found a 20-fold increase in abundance of snags < 15 cm dbh. Several studies showed that the highest snag losses were in areas where a long period of fire exclusion had occurred (Bagne et al. 1988, Holden et al. 2006). Bagne et al. (2008) and Horton and Mannan (1988) found that re-entry burns had a much lower mortality

rate for snags, presumably because the trees that did not burn during the first entry were more resilient. Loss of snags from prescribed fire was partially mitigated by the creation of new snags (Horton and Mannan 1988, Bagne et al. 2008). Similarly outcomes are expected with the Melvin Butte project. The majority of these stands have not been burned for decades and this will be the first entry with prescribed fire. This treatment will be beneficial to the flicker from both a foraging and nesting stand point. Prescribed burning will remove herbaceous vegetation, providing ample opportunities for ground forage for the flicker and snag recruitment in the overstory which will also provide both nesting and foraging opportunities.

Table 26 summarizes the amount of habitat associated with treatments under each action alternative for the Melvin Butte project.

Table 26: Total Acres of Flicker Habitat Associated with each Treatment Type by Alternative.

Treatment Type	Alternative 2	Alternative 3
B	84	84
HTH	31	35
MC – No Group Opening	-	12
MCGO	12	-
P	162	162
Scenic Views Enhancement	41	41
Total Acres.	**330**	**334**

Overall, approximately 330 acres of habitat are associated with treatments identified under Alternative 2, and approximately 334 acres under Alternative 3. Both alternatives are similar however, Alternative 2 is more proactive in creating more fire resilient stands within mixed conifer by removing fading white-fir by creating small group opening and planting them to ponderosa pine. Overall treatments are fairly small on the landscape (<1% at the Forest scale and 1% at the watershed level) and very little habitat is associated with treatments.

Proposed treatments would reduce the risk of high intensity wildfire by thinning the understory, and reducing the ladder fuels that make the area susceptible to a stand replacing fire. Treatments would accelerate stand development providing long-term habitat for the flicker which prefers a variety of habitat types but focus on mature stands. Although the recruitment of dead wood habitats would be slow, silvicultural treatments would provide beneficial indirect effects by promoting faster growth of green tree replacements, ultimately providing larger diameter snags and down wood over the next 30+ years. As the stands age, additional snags and logs would develop, providing a higher diversity of habitat and structure. As a result, stands would contain more abundant nesting habitat. In the short-term, commercial thinning from below and thinning of plantations with advance regeneration will reduce the dense understory in the ponderosa pine and mixed conifer stands, which could promote ground foraging for the flicker.

See DecAID Snag and Log Analysis for the projects effect to dead wood habitat and distribution.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Table 1 (cumulative effect table for wildlife)was reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to northern flicker reproductive habitat. The Deep Canyon watershed is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Three large wildfires have occurred within the Deep Canyon Watershed – Rooster Rock Fire (2010), Pole Creek Fire (2012), and Two Bull Fire (2014). Approximately 54 acres of ongoing fire salvage is occurring

in the Pole Creek Fire and approximately 250 acres of fire salvage is proposed within the Two Bulls Fire where the fires are associated with the Deep Canyon watershed. Danger tree removal has occurred or will occur on all the fires mentioned above to varying degrees resulting in a reduction of potential nest sites in stand replacement areas along main roads. The Two Bulls Fire proposes to salvage 250 acres of stand replacing fire within ponderosa pine habitat within Deep Canyon watershed. The fire salvage will only remove snags less than 20 inches dbh. Pole Creek and Two Bulls fire salvage both remove snag habitat that will reduce potential reproductive habitat for the northern flicker.

Activities proposed under the Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood project have occurred or may occur in suitable habitat. The Ursus, Bend Municipal Watershed Hazardous Fuels reduction, and Bear Wallow Firewood project focus primarily on removing dead lodgepole pine among green stands to reduce fuel loading, some of the activity could occur in mixed conifer habitat but will primarily occur in lodgepole pine habitat. The Overall, treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances. There are approximately 7,114 acres associated with these projects, none of these projects propose to remove large snags, however they will be removing medium size snags averaging approximately 14 inches dbh. The treatments will remove concentrations of dead lodgepole pine and white fir to break up the fuel continuity in the project areas. Treatments will remove habitat, but large snags will be retained on an individual basis to maintain snags habitat throughout the project areas.

Conclusion

Cumulatively, because this project impacts less than 1% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of the northern flicker is expected on the Deschutes National Forest.

Mitigation Measures: None

Recommendations:

1. To avoid potential nest destruction and loss of broods, schedule harvest and post harvest activities outside of nesting season in appropriate habitat (March 15 through June 30).

American Marten

Existing Condition

Martens are closely associated with forested habitats that have complex physical structure near the ground (Buskirk and Powell 1994, Bull et al. 2005, Slauson et al. 2004 and 2007). Open areas, such as regeneration logging units, recent severely burned areas, and natural openings are avoided, especially during the winter. Martens cross and re-cross their own tracks to investigate micro habitat features, such as stumps, logs, and brush piles that might contain food. They often use fallen logs as runways (Clark et al. 1987). Forested riparian habitats are used disproportionately higher than they are available, which indicates their importance as travel corridors (Bull and Heater 2005, Buskirk et al. 1989). (USFS 2012)

Much of their time during winter is spent resting or hunting beneath the snow in subnivean spaces created by physical structure close to the ground. This complex structure is more characteristic of older forest structural stages than younger forests. These conditions are also more characteristic of moist and cold

forest types where fire return intervals are greater, allowing time for dead wood to be recruited and accumulate. Large logs may be particularly important as winter resting structures (Bennett 1984). (USFS 2012)

Martens are extremely susceptible to predation and are reluctant to venture into openings (Buskirk and Powell 1994). Martens seem to be sensitive to patch size, and usually avoid open habitats dominated by grasses, forbs, and saplings, especially in winter. These areas do not provide the structure necessary for a network of travel ways under the snow, nor do they offer access to this subnivean zone. A lack of overstory cover offers little protection from predators. These open habitats also have more severe microclimatic conditions than areas with forest canopy cover (Buskirk and Powell 1994). (USFS 2012)

Older aged forests often provide overstory cover from avian predators and the means to escape avian and mammalian predators (Bull and Heater 2001). Because marten avoid openings and prefer larger forest patches (Chapin et al.1998 and Hargis et al.1999), habitat fragmentation may lead to isolation of local populations too small for long term viability (Gibilisco 1994). (USFS 2012)

Marten use a variety of structures for resting and denning sites. Resting and denning sites offer protection from predation and thermal stress; thus, availability of quality denning sites likely increases the rates of survival and fecundity in marten (Raphael and Jones 1997). A variety of structures are used for dens, with trees, logs, and rocks accounting for 70 percent of the reported den structures. In virtually all cases of dens in trees, snags, or logs, dens were found in large structures characteristic of late-successional forests. In the Blue Mountains, marten selected for specific habitat as determined by comparing used sites with available and unoccupied sites ($p<0.01$) (Bull et al. 2005). Stands used by martens had higher densities of large snags greater than 20 inches dbh and trees greater than 10 inches dbh. They selected unharvested, closed canopy (50-75%), old-structure stands in subalpine fir and spruce forests. Northern aspects in upper slopes and drainages were selected for. In the Cascades, marten selected sites with higher canopy closure during snow periods than during snow-free periods (Raphael and Jones 1997). In Oregon, canopy closure at rest sites in lodgepole pine dominated stands averaged 36% in snow periods and 27% in snow-free periods. (USFS 2012)

Raphael and Jones (1997) found that down wood and slash piles were important resting and denning structures in the eastern Cascades of central Oregon. Forests in their study area were dominated by lodgepole pine. (USFS 2012)

The current conservation status of the American marten as listed by NatureServe, as secure nationally and globally, but the Oregon Department of Fish and Wildlife Sensitive Species List status is Vulnerable which signifies that the species is facing one or more threats to their populations and/or habitats. Vulnerable species are not currently imperiled in a specific geographic area or the state, but could become so with continued or increased threats to populations and/or habitats.

Historically the primary threat to marten range-wide was loss of source habitat through conversion to early seral stages by logging or wildfire. The Land and Resource Management Plan (LRMP) for the Deschutes National Forest went into effect in 1990 and the LRMP recognized the current mountain pine beetle epidemic was killing thousands of acres of lodgepole pine forest and removing habitat for marten. In the early 2000s uncharacteristic wildfires contributed to additional loss of habitat on the forest. Thousands of acres of dead and dying trees created conditions suitable for stand replacement wildfires that increased in acreage to 46,660 acres during the 1990s decade and mushroomed to 190,000 acres during the 2000-2010 decade. While not all of this acreage was suitable marten denning habitat, much of the fire acreage in both decades was in mixed conifer and mountain hemlock plant associations that provided marten resting, foraging, and denning habitat. The majority of the acreage occurred on the north end of the Deschutes National Forest, Sisters Ranger District. Most of the fire acreage was defined as stand replacement that removed the overstory as well consuming much of the coarse woody debris on the ground and standing snags. This combination removed marten foraging, resting, and denning suitability

on tens of thousands of acres and has likely had the greatest impact on marten on the Deschutes National Forest over the last 20 years the DLRMP has been in place. (USFS 2012)

The Melvin Butte project contains very little marten habitat due to the fact that there is only minor amounts of mixed conifer wet and lodgepole pine PAGs in the project area. Marten habitat occurs in the project area at higher elevation mixed conifer, mountain hemlock, and residual green lodgepole pine stands. This habitat is contained in the western end of the project area and occurs above 5400 feet. Marten probably avoid the ponderosa pine and mixed conifer dry PAGs due to the more open nature of the stands and their tendency to avoid openings (Ruggerio et al. 1994). These stands also lack complex horizontal structure typically found in more mesic forest conditions and along riparian reserves. However, they may use the area for dispersal in a north to south continuum along the slopes of the Cascades. Some individual blocks of habitat occur in mixed conifer dry stands and although it is marginal habitat, the habitat was identified based upon the overstory canopy cover the stands provide.

Through the Forest wide assessment completed for MIS, American marten reproductive habitat was mapped across the entire Deschutes National Forest. Approximately 968 acres of habitat exists within the project area. Approximately 6,168 acres of habitat occurs within the Deep Canyon watershed, and approximately 435,607 acres of habitat occurs across the Deschutes National Forest. The following Table 27 summarizes these acreages:

Table 27. American Marten Habitat within the Melvin Butte Project Area, Deep Canyon Watershed, and across the Deschutes National Forest.

Acres of Habitat in the Melvin Butte Project Area	Acres of Habitat in the Deep Canyon Watershed	Acres of Habitat Across the Deschutes National Forest
968 acres	6,168 acres	435,607 acres

Denning habitat was modeled in Wildhab using all plant association groups (PAGs) except juniper and ponderosa pine without the presence of lodgepole pine. Only dense stands were considered denning habitat except in the lodgepole pine and dry cold white fir PAGs where open and dense were deemed suitable for denning. Those PAGs where lodgepole pine is an early seral species were also considered suitable denning habitat. Minimum dbh was defined as equal to or greater than 5 inches (Class 3) for lodgepole pine and equal to or greater than 15 inches (class 5) for the other PAGs.

For the detailed assessment on the marten for the Deschutes National Forest, see the Forest-wide Species Assessment (USFS 2012).

Measure: Acres of reproductive habitat affected for marten

Environmental Consequences

Alternative 1 – No Action – Existing Ecological Trend

Within the Deep Canyon watershed within the lodgepole pine community, a mountain pine beetle out break occurred killing 90% of the lodgepole pine stands from 2001 to 2008, with beetle mortality continuing to date. Very little canopy cover occurs in these stands making marten susceptible to predation, rendering these stands unsuitable habitat. Overtime, as dead trees are recruited as down logs, these concentrations of down logs accumulate and subnivean foraging and resting opportunities will be provided for the marten. Within mixed conifer stands, areas that currently provide suitable marten habitat would most likely have increased mortality due to tree stress from competition. Without the treatments prescribed to thin from below within multi-storied mixed conifer stands, stand densities will reduce the longevity of residual old growth and large tree structure that occurs in these stands. In the short-term,

available denning habitat will be limited and in the long-term the future development late and old structure characteristics would be prolonged as well as stands containing sufficient canopy cover to provide protection from predation.

Stand resilience to insects, disease, and wildfire is measured by the Upper Management Zone (UMZ). The UMZ relates to the density of trees (basal area, trees per acre, etc.) a forest stand can support without significant mortality from bark beetles. The upper management zone is the density level at which trees begin to come under significant stress and can become susceptible to bark beetles and other insects and diseases. Forest stands managed below the upper management zone are more resilient. There are approximately 4,456 acres that have the potential to receive vegetation treatment. Under the existing condition/no action 92% of these stands are above the Upper Management Zone and are at risk or currently be impact by insects and disease due to high stand densities and as a result low resiliency. Approximately 29% (1,571 acres) of the project area is within the wet mixed conifer PAG, approximately 10% (531 acres) in lodgepole pine PAG, and <1% (8 acres) in the mountain hemlock PAG.

Across the Deschutes National Forest, landscape scale fires have created a decline of marten habitat over the last 10 years. These fires have consumed large areas of mixed conifer stands due to fuel concentration and stand densities associated with the mixed conifer PAG's. A stand replacing fire event would remove marten habitat, and would take several decades to re-establish suitable marten habitat.

Overall, high stand densities will result in a decrease in tree vigor among all size classes. The most significant effect of high stand densities will be the gradual loss of the existing historic large-tree component/denning habitat which is likely to be at a much higher rate than if stand densities were reduced to more healthy levels.

Alternative 2 and 3- Direct and Indirect Effects

Thinning From Below (HTH), Mixed Conifer Thinning From Below With and Without Group Openings (MCGO and MCw/oGO)

Thinning in suitable marten habitat would occur in mixed conifer stands containing residual old growth trees. Thinning from below (from 8" dbh and up) will favor ponderosa pine and healthy white-fir. The target basal area is between 40 to 60 square feet post treatment but will vary from 40 to 140 square feet for dominant overstory tree species in each stand. Where stands are dominated by white-fir, basal areas will be higher, as residual overstory white-fir will be left in aggregate patches and as individual trees. Different scenarios exist depending on alternative and the existing basal area, site productivity, and stand structure objectives. This treatment aids in maintaining large trees by reducing their susceptibility to fire and insects by removing competition for space and nutrients. Thinning decreases stand densities and allows for faster growth of young trees while reducing risk (removal of ladder fuels). However, canopy cover is reduced overall resulting in more open stands. Negative impacts may result from more open stands, reducing the canopy cover and potentially making the marten more susceptible to predation. Beneficial impacts should result from reducing risk to existing suitable habitat and facilitating the development of future habitat. This treatment will not remove any snags or down wood unless the snag poses a hazard during operations. Snag cavities utilized by marten are often white-fir snags excavated by pileated woodpeckers. Treatments will maintain the largest and healthiest white-fir to provide future snags and down wood.

Due to the removal of ponderosa pine from past management activities within the areas identified for MCGO treatment, stands are comprised primarily of white-fir and lodgepole pine. These tree species are not fire resistant and due to mountain pine beetle outbreaks in the project area, much of the lodgepole pine is dead. As a result of the mortality in these stands, canopy closure is low reducing the amount of suitable reproductive marten habitat and increasing fueling loading in these areas. White-fir is also a short-lived species, and highly susceptible to insects and disease, and many of the white-fir in these stands

are declining from mistletoe. The project proposes to remove the overstory and promote ponderosa pine within these stands where it previously existed, creating a more fire resilient mixed conifer stand in the long-term. To maintain habitat for the marten as well as other species dependent on interior forest habitat, through mosaic thinning, healthy white-fir will be retained as individuals and in clumps. High densities of small dead trees (<7" dbh) that contribute to fuel loadings may be removed, but the large snags meeting habitat requirement >10inches dbh will be retained to provide short-term habitat for rest site opportunities. Negative impacts may result from more open stands by removing dense patches, creating areas where marten are more susceptible to predation. Long-term beneficial impacts should result from treatments by reducing risk to existing suitable habitat and facilitating the development of more fire resistant future habitat by promoting the development of ponderosa pine in these stands. Where interlocking crowns remain in the overstory, marten use will continue due to the security and overstory structure that the stands will continue to provide.

Lodgepole Pine Improvement (LPI)

LPI treatments will also treat some mixed conifer habitat. Treatments are focused on removing unhealthy lodgpole pine from stands to reduce beetle mortality to green stands and promote green tree vigor. Although treatments will remove commercial size trees they will primarily be smaller diameter trees that will be removed, therefore this will be a minor impact to reproductive habitat associated with these species. Minimal effects are anticipated due to the limited amount of habitat associated with this treatment type.

Prescribed Burning (B)

Prescribed burning is also proposed. These treatments will reduce both activity fuels and overall fuel loadings to acceptable levels. Fuel treatments will reduce fire risk and will reduce competition to established trees, increasing the stands resiliency to wildfire. The objective is to create a mosaic of burned and unburned areas, creating a discontinuous distribution of fuel throughout the project areas. Although burning could reduce down log concentrations, snags will likely be created and will be recruited as down wood in the short-term. Treatments will reduce the risk of stand replacing fire which has greatly impacted marten habitat across the district due to the loss of interior forest habitats.

Scenic Views Enhancement

The Scenic Views Enhancement treatment was developed to meet Scenic Views objectives associated with the 16 road corridor. As a result of the Pole Creek Fire this area received stand replacing fire, to meet forest plan standards and guides, areas containing high densities of small dead trees will be removed to enhance scenic quality. All green trees and large snags that contribute to visual quality will be retained. This treatment will not likely reduce reproductive habitat or future habitat since all green trees and large snags will exist post treatment.

Table 28 summarizes the amount of marten reproductive habitat associated with each action alternative identified for the Melvin Butte project.

Table 28: Total Acres of Marten Reproductive Habitat Associated with each Treatment Type by Alternative.

Treatment Type	Alternative 2	Alternative 3
B	207	207
HTH	325	383
MC – No Group Opening	-	50
LPI	17	17
MCGO	50	-
Scenic Views Enhancement	50	50
Total Acres.	**649**	**707**

Affects to marten habitat are similar under Alternatives 2 and 3. The outcomes of the affects to habitat as a result of each treatment type are also consistent across both action alternatives. The project area and habitat varies greatly from north to south due to the change in elevation and inherent soil quality within this north to south pattern. To capture the importance of habitat variation across the project area, the project area was broken up into three productivity zones north to south. A habitat retention strategy was defined where in the low elevation ponderosa pine approximately 10% of area would be left in un-treated stands and aggregate patches, in the mid-elevation ponderosa pine/ mixed conifer dry habitat with moderate site productivity approximately 15% of this landscape would be left in untreated stands and aggregate patches, and within the high elevation mixed conifer wet stands with high site productivity, approximately 20% of this landscape would left in untreated stands and aggregate patches. These untreated areas were identified to retain habitat connectivity between thinned stands associated with project treatments and maintain marten habitat over time.

Overstory structural diversity will be reduced in MCGO and MC-no openings units but will remain in HTH units and understory complexities will be reduced through follow up fuels treatments to deal with slash generated from thinning activities. Fuels treatments associated with harvest treatments may have impacts to martens and their prey species. Although prey habitat will be reduced in the short-term, some residual habitat will remain providing foraging opportunities for the marten. Long-term benefits of treatments will be a reduction of stress to the overstory promoting the longevity of the residual large tree structure, but also promoting the development of future old growth in stands that will be thinned from below, providing long-term habitat. Similarly, in a meta-analysis by Fontaine and Kennedy 2012, the analysis showed that surrogate fuels treatments (thinning and prescribed fire) in fire prone forests, increased vertebrate biodiversity.

Affected habitat varies little between each alternative and these differences are insignificant.

There are approximately 4,456 acres that have the potential to receive vegetation treatments. As a result of both action alternatives, 90% of these stands will be below the Upper Management Zone. Treatment will greatly increase stand resiliency to insects, disease, and wildfire through stand density reductions.

Overall, approximately 649 acres of marten reproductive habitat are associated with treatments identified under Alternative 2 and approximately 707 acres under Alternative 3 totaling 70% of the existing reproductive habitat in the project area. The majority of these treatments will occur in the wet mixed conifer PAG. Thinning and burning will reduce snag and down wood structural complexities that contribute to marten reproductive habitat. Thinning will reduce the overall canopy closure associated with these areas with the goal of crown fire reduction. Although burning will recruit snags and down wood, slash treatment associated with these stand will decrease overall down wood level in the stands minimally meeting Forest Plan objectives. Marten reproductive habitat will be reduced within the project area, however a full stocked overstory will remain post treatment. Although these stands may not meet the need for marten denning habitat, these areas will still provide avenues for dispersal.

See snag and down wood analyses to review the projects effect to dead wood habitat as it relates to the marten.

Alternative 2 and Alternative 3 – Cumulative Effects

Activities identified in Table 1 were reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to the marten. The Deep Canyon watershed will be used to discuss cumulative impacts to this species.

Three large wildfires have occurred within the Deep Canyon Watershed –Rooster Rock (2010), Pole Creek (2012), and Two Bulls Fires (2014). Approximately 54 acres of salvage logging are ongoing

within the Pole Creek Fire and approximately 250 acres of salvage logging is being proposed within the Two Bull Fire. Danger tree removal along main roads has occurred or will occur on all the fires mentioned above to varying degrees. Salvage activities and danger tree abatement will occur within areas of stand replacing fire in Pole Creek Fire Salvage and does not provide marten habitat. Also the Two Bulls Fire Salvage occurs in low elevation ponderosa pine, therefore does not occur within marten habitat.

Activities proposed under the Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Firewood project have occurred or may occur in suitable habitat. The Ursus project, Bend Municipal Watershed Hazardous Fuels reduction project, and Bear Wallow Firewood project all focus primarily on removing dead lodgepole pine among green stands to reduce fuel loading, some of the activity could occur in mixed conifer habitat but will primarily occur in lodgepole pine habitat. Treatments proposed will reduce the risk of loss of existing habitat from future large-scale disturbances. There are approximately 7,115 acres associated with these projects, none of these projects propose to remove large snags within mixed conifer, however treatments associated with these projects will contribute to an overall reduction in canopy closure. The objectives of these treatments are to reduce the risk of crown fires on the landscape, post treatment habitat suitability will diminish for marten. In areas containing concentration of snags and down logs, these concentrations will be removed and therefore will lack dead wood complexities that provide marten habitat. Minimally treatment will meet Forest Plan standards and guides for snags and down logs. Where green stands exist, fully stocked stands will be retained post thinning, minimally providing dispersal opportunities for marten. However, treated stands will likely not provide denning opportunities.

Treatments associated with the mixed conifer PAG propose thinning from below, promoting the development of contiguous stands of late and old structure habitat that this species needs for denning. In mixed conifer habitat dominated by ponderosa pine, the project will also manage stands by thinning from below, but will favor the ponderosa pine to develop a more fire resistant stand containing large ponderosa pine as the dominant species. Treatment will maintain large white-fir in the overstory, except where it is the dominant species and then ponderosa pine will be promoted. Through project design criteria, treatments have been designed to maintain untreated stands throughout the project providing small tree diversity that could also provide habitat for marten.

Overall, implementation of the action alternatives as well as other ongoing projects in the Deep Canyon Watershed should result in improved habitat conditions for this in the long-term. Cumulatively, in the short-term there will be a decrease in dense understory habitat; reducing denning and foraging opportunities. Treatments will maintain healthy white-fir in the overstory promoting a more fire resilient mixed conifer stand and minimizing the risk of losing more landscape to wildfire, creating unsuitable habitat for marten. Large untreated blocks of habitat have been retained throughout the project area to provide habitat connectivity as well as retention of habitat within each treatment unit. The project will promote long-term habitat for this species by reducing the risk of stand replacing fire, and promoting the development of large tree structure in mixed conifer stands.

Melvin Butte project will reduce marten reproductive habitat on approximately 10% of the Deep Canyon Watershed.

Conclusion

Cumulatively, because this project impacts less than 1% of suitable American marten habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Forest. The Melvin Butte project is consistent with the Forest Plan, and thus continued viability of American marten is expected on the Deschutes National Forest.

Consistency with the Deschutes LRMP
Wildlife standard and guideline WL-63 will be assessed. The project is consistent with the Deschutes LRMP.

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-63 – In preferred forest types, concentrations of down woody material will be left at an average of approx. one per acre after any timber harvest. Concentrations incorporating high tree stumps, logs, or snags are especially desirable.	Meets	This project does not target large snags for removal.

Mitigation Measures

1. Large snags and logs are not targeted for removal. Where snags and logs need to be removed for thinning purposes, NWFP standards and guides will be applied on a per unit basis.

Recommendations: None

Snags and Down Wood

Dead wood (standing or down) plays an important role in overall ecosystem health, soil productivity and numerous species' habitat. This dead wood habitat is crucial in the continuation of species that depend on snags and logs for all or parts of their life cycle (Laudenslayer 2002). Bird and mammal species rely on dead wood for dens, nests, resting, roosting, and/or feeding on the animals and organisms that use dead wood for all or parts of their life cycle. Snags come in all sizes and go through breakdown and decay processes that change them from standing hard to soft, then on the ground to continue decaying into soil nutrients.

Not every stage of the snag's decay stage is utilized by the same species, but rather a whole array at various stages or conditions. In forested environments, 93 wildlife species are associated with snags. This includes 4 amphibians, 63 birds, and 26 mammal species (Rose et al. 2001). Uses of snags include nesting, roosting, preening, foraging, perching, courtship, drumming, and hibernating.

Snag and down wood levels are best analyzed at scales of subwatersheds or greater (Mellen et al. 2006). Due to the recent fires that span both the Whychus and Deep Canyon watersheds snags and down wood will be addressed as they relate to size, density, and distribution by habitat type for the Melvin Butte project area and within both the Whychus and Deep Canyon watersheds (262,308). The Whychus and Deep Canyon watersheds will be the zone of influence for measuring cumulative effects for snags and down wood.

Approximately, 642 acres of the Pole Creek Fire of 2012 overlap and is directly adjacent to the Melvin Butte project area. Fires are a unique phenomenon, creating a boom and bust cycle of dead wood habitat, when looking across a large landscape. Habitats created by fire represent only a small percentage of broad landscapes. Therefore, analyses of fire created dead wood habitats need to be conducted on a larger area to help determine how individual fire areas are contributing to habitat at the larger scale.

There are four general habitat types found within the Melvin Butte project area; ponderosa pine/Douglas-fir (PPDF), eastside mixed conifer (EMC), lodgepole pine (LPP), and montane mixed conifer (MMC). The ponderosa pine/Douglas-fir habitat type is dominated by ponderosa pine trees; no Douglas-fir exists within the Melvin Butte project area. The eastside mixed conifer habitat type consists of several different tree species (e.g. ponderosa pine, white fir, lodgepole pine). The lodgepole habitat type is dominated by lodgepole pine, but white-fir and ponderosa pine can be found in these stands. The montane mixed conifer habitat type includes a mix of several high elevation tree species. Tree species found in this habitat type include those mentioned previously as well as subalpine fir, whitebark pine, and western white pine. The same compliment of habitat types is also found within the Deep Canyon and Whychus Watersheds. See Appendix 4 for more information.

DecAID will not be used to analyze snags, but DecAID will be used to evaluate habitat to individual species that utilize snags. **"Forest inventory data are not available for recent post-disturbance habitats"** (emphasis added). High snag densities resulting from these disturbances are temporary because snag densities decline rapidly as snags fall in the first decade or so after the disturbance. As a result, stands which have recently sustained a stand-replacing disturbance are not well represented in the inventory data in DecAID, even those from unharvested plots; they are an extremely small proportion of the landscape at any one point in time. Plots occurring in areas experiencing recent fire or other stand replacing disturbance likely are included in the inventory data from one of the other three structural condition classes and are likely plots with high levels of down wood (i.e., the right side of the distribution histograms). It was not possible to separate out plots occurring in these disturbed areas. As a result, inventory data are not available for recent post-fire habitats. (Mellen-McLean 2006). Due to the large amount of recent post fire habitat associated with the Whychus and Deep Canyon watersheds, forest inventory data will not be utilized for the cumulative effects analysis that is conducted at the watershed scale.

The Melvin Butte Project is within Northwest Forest Plan (NWFP) Lands which amends the Deschutes NF LRMP, the NWFP provides the management direction for the Melvin Butte project. The following summary of land management direction is displayed to compare standards and guides associated with the Deschutes National Forest. This comparison is given to understand which the most restrictive direction is and how dead wood habitat will be managed based on the best available science and guidance.

Northwest Forest Plan (NWFP)

The NWFP provides S&Gs for snags and logs by land allocation (USDI and USDA 1994). There is no management within congressionally reserved lands; therefore, there are no S&Gs for snags and down wood. Harvest is limited in riparian reserves and late-successional reserves (LSRs) and treatments must meet the attainment of the Aquatic Conservation Strategy Objectives and follow guidance in LSR Assessments. Standards and guidelines for the matrix allocation also apply to the Administratively Withdrawn allocation.

Matrix S&Gs include the retention of green tree replacements and snags both in patches and singly. For treatments such as clear-cuts with reserves and shelterwood harvests, 15% of the area associated with each cutting unit is to be retained. However, this S&G does not apply to intermediate harvests (i.e. thinning). At a minimum, snags are to be retained in the harvest units at levels sufficient to support species of cavity nesting birds at 40% potential population levels.

Provide specified amounts of coarse woody debris in matrix management. In eastern Oregon, a minimum of 120 lineal feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long should be retained.

Deschutes NF LRMP S&Gs

Standards and guidelines in the Deschutes NF LRMP which apply to species associated with snags and down wood include WL-37 and WL-38:

WL-37: In coniferous forest, sufficient snags will be maintained to provide 40 percent of potential population levels of cavity nesting species within even-aged harvest units of the General Forest, visual areas (retention, partial retention, and middle ground), and Deer Management Area allocations. In uneven-aged harvest units, within the management areas noted above, live replacement trees will be left during any harvest to assure 60 percent of cavity nesting potential through the rotation, except where natural deficits occur in diameter classes. In both even and uneven-aged management, groupings of green replacements will be the preferred implementation technique. Compliance will be based on the harvest unit area rather than an individual acre evaluation. In all other management areas, at least 60 percent of cavity nesting species potential population needs will be provided.

WL-38: Specific guidance will be provided by the Deschutes National Forest Wildlife Tree Implementation Plan.

WL-72: Logs and downed woody debris will be retained after timber management activities with an average of at least 3 cull logs per acre, plus 3 additional logs per acre in more advanced stages of decomposition.

Wildlife Tree and Log Implementation Strategy

The Deschutes National Forest Wildlife Tree and Log Implementation Strategy (WLTL) provides guidance and options for meeting the snag, green tree replacement (GTR), and down log objectives across the forest, regardless of management direction (USFS 1994b). This strategy focuses on the treatment unit as the area of accountability for meeting WLTL objectives. It states that "Snags, GTRs, and down logs will not be provided on every acre in the forested ecosystem. A mosaic distribution of WLTL resources across the landscape maintaining viable populations and ecological functions is the desired condition." Current literature and research at the time, as well as incorporating the NWFP and Eastside Screen requirements were used to develop the number of hard snags (recently dead standing snag) needed by each species to support various percentages of their population. These were developed for each vegetative series and for areas west and east of the Northwest Forest Plan line.

The following table summarizes the estimated number of snags per acre to meet 100% maximum population potential (MPP) for cavity nesters, and estimated number of trees per acre (tpa) required to meet best available science for Green Tree Replacements (GTRs) is as follows

Table 29: Snag and GTRs for Wildlife Tree and log Implementation Strategy

	Habitat Type		
	Ponderosa Pine	**Mixed Conifer**	**Lodgepole Pine**
100% MPP based on best available science	4 snags/acre	4 snags/acre	6 snags/acre
GTRs @ 13-19" residual stand*	8 tpa	8 tpa	6 tpa

*This concurs with the 10-19" average dbh for the small/medium structure stage defined in DecAID.

Biological Potential

Habitat requirements, including snag and down woody material levels, were described in the LRMP and amended Eastside Screens for a variety of wildlife species using information known at the time in Thomas (1979) and Brown (1985). However, more recent empirical studies indicate that snag numbers and sizes selected by some wildlife species are far higher than those calculated by the maximum potential population technique (Bull et al. 1997, Rose et al. 2001).

This suggests that the LRMP direction of managing for 100 percent population levels (WL-37 S&G) of primary excavators may not represent the most current knowledge of managing for cavity nesters and that these snag levels, under certain conditions, may not be adequate for some species, particularly for secondary cavity nesters. In addition, the current direction provides recommendations for green stands only when studies show that cavity-nesting birds require higher snag densities in post-fire conditions versus green stands for nesting and productivity (Bull et al. 1997, Rose et al. 2001). This is likely because cavity-nesting birds require more snags for foraging, cover, and protection from predators in post-fire environments.

DecAID advisory tool

The DecAID Advisor (Mellen-McLean et al. 2009) is used as the best available science for the Melvin Butte snag analysis. DecAID is a web-based advisory tool that helps managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags and down wood. It is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. DecAID is used to estimate sizes and densities of dead wood that provide habitat for many species and ecological processes. It presents information on the range of "natural conditions" (as represented by unharvested plots within the plots sampled), "current conditions" (all plots sampled, including both unharvested and harvested plots), and wildlife use.

Historical Range of Variability

The terms Historical Range of Variability (HRV), Natural Conditions, and Historical Conditions in DecAID are sometimes used interchangeably to indicate conditions which occurred on the landscape prior to the influence of humans (particularly Europeans). Because it is difficult to determine the actual snag and down wood levels prior to the influence of humans, the term Reference Condition is used in DecAID when referring to the use of vegetation inventory data from DecAID based on data from unharvested plots. When using the "natural condition" of snag and down wood distribution represented by the summary of forest inventory data from unharvested inventory data in DecAID, caution should be used due to years of fire exclusion. The vegetation data can help determine the "natural range of variability" for dead wood, which can be used as a proxy for HRV. It is assumed that adequate habitat will be provided because species which survived those levels of habitat in the past are present today. The more that current conditions deviate from HRV, the less likely it is that adequate habitat occurs on the landscape to sustain those species. Although existing snag and down wood levels and composition in DecAID may not accurately reflect pre-European "natural" or historical conditions, they are still within reason when comparing them to other recent research.

Comparison of DecAID with other research

Harrod et al. (1998) estimated snag densities in ponderosa pine dominated dry forests for snag densities (> 6" dbh) at 6 to 14 snags per acre (4.5-7.0 tons per acre) in pre-European settlement landscapes. These estimates were derived by calculating the basal area of snags from pre-1930 growth rates, holding forest stand structure relatively constant (i.e., as a new live tree is recruited another one becomes a mortality) and applying published snag fall rates (Bull et al. 1980, Keen 1929, Raphael and Morrison 1987, and Schmid et al. 1985). It was assumed that historical frequent, low intensity fires did not accelerate snag fall rates.

Agee (2002) estimated lower snag densities (2 snags per acre) than Harrod et al. (1998) for the ponderosa pine/Douglas-fir forest series by estimating the number of trees in 0.25 acre clumps of 16 age classes and assuming that the oldest patch was killed by insects every 25 years. He assumed fire helped to decompose snag patches and after 5 fires at 10 year intervals, snags would be completely consumed. Agee (2002) compared his estimates to Harrod et al. (1998) but assumed an average snag diameter of 30" dbh when calculating biomass, whereas Harrod et al. (1998) estimated densities for size classes as small as 6" dbh. Results from regional studies in Eastern Washington and Oregon (across all land ownerships) by Ohmann and Waddell (2002) suggest there are currently 2.025 total snags per acre greater than 10"dbh, of which 0.405 snags are greater than 20"dbh.

Snag densities reported by Harrod et al. (1998), Agee (2002), and Ohmann and Waddell (2002) are within the range (50% tolerance level) of those reported in DecAID (Mellen-McLean et al. 2009) for Ponderosa pine/Douglas-fir and Eastside Mixed Conifer habitat types for small and medium trees.

How DecAID was Reviewed for the Melvin Butte Project

Analysis areas should be sufficiently large to encompass the range of variation in wildlife habitat types and structural conditions that occur in the area (Mellen-McLean et al. 2009). In general, at least 20 square miles (12,800 acres) in each habitat type is suggested as a minimum size for an analysis. The Whychus and Deep Canyon watersheds (HUC 10) were used for an appropriate comparison to the vegetation inventory data in DecAID for the Melvin Butte project area.

The PAGs in the Melvin Butte project area were compared to habitat types in DecAID. The DecAID habitat types are: (1) ponderosa pine/Douglas-fir (PP/DF) which best represents the ponderosa pine dry (PPD) and ponderosa pine wet (PPW) PAGs; (2) eastside mixed conifer (EMC) which best represents the mixed conifer wet (MCW) and MCD mixed conifer dry (MCD) PAGs; and (3) lodgepole pine (LP) (Table 30).

Table 30: Plant Association Groups, Corresponding Habitat Types in DecAID, and acres in the Melvin Butte Project Area

Plant Association Group in Melvin Butte project area	DecAID Habitat Type	Number of Acres in the Melvin Butte project area
Ponderosa pine (wet and dry)	Ponderosa Pine/Douglas Fir	1,123
Mixed conifer (wet and dry)	Eastside Mixed Conifer	3,694
Lodgepole Pine (wet and dry)	Lodgepole Pine	530
Mountain Hemlock (dry)	Montane Mixed Conifer	8

An HRV analysis of existing snag density and down wood across the Deschutes National Forest and at the 5th field watershed (HUC 10) level used information from DecAID and the Ochoco and Deschutes Viable Ecosystems Management Guide (*Viable*, USDA FS 1994c). The Viable model was developed to classify vegetation on a landscape basis and compares existing vegetation with site potential. Viable stratifies the environment along a gradient of size, structure, species composition, and relative tree density. The various classifications are then linked to wildlife habitat requirements. The 2004 Deschutes National Forest satellite imagery layer was used to develop the Viable map. Data is mapped on a 25 meter pixel grid and assigned a value relating to size, structure, tree species, and tree density for the animal species. The resulting layer was then updated by removing stand replacement and mixed mortality fires and forest management activities within the last five years.

The percentage of the landscape in each snag category was then weighted to match the HRV ranges from the Viable analysis. The snags per acre categories were summarized to get a historical range of snag densities that would be expected to occur in the Melvin Butte analysis area.

Wildlife Data Tolerance Level

In DecAID, a tolerance level as it relates to wildlife data is defined as follows: "Tolerance Levels are estimates of the percent of all individuals in the population that are within some specified range of values" (Mellen-McLean et al. 2009). DecAID is not a viability model and tolerance levels should not be interpreted as population viability "thresholds." DecAID tolerance levels may be interpreted as three levels of "assurance": low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level)" (Mellen-McLean et al. 2009). The higher the tolerance level, the higher the "assurance" that snag habitat is being provided. For example, using data from the wildlife species curves for white-headed woodpeckers in small and medium sized trees in the ponderosa pine/ Douglas-fir habitat type, the snag density (≥10"dbh) for white-headed woodpeckers is as follows:

Table 31: Wildlife Data Tolerance Level

Tolerance Level	Snags per acre	Explanation
30% tolerance level	0.3 snags/acre	Areas with < 0.3 snags/acre would be expected to be used for nesting by only 30% of the individuals within the population of white headed woodpeckers, and conversely 70% of the population would be expected to nest in areas with > 0.3 snags/acre.
50% tolerance level	1.7 snags/acre	Half the individuals within the population would be expected to nest in areas with <1.7 snags/acre and the other half would be expected to nest in areas with >1.7 snags/acre.
80% tolerance level	3.7 snags/acre	80% of the individuals within the population of white headed woodpeckers would be expected to nest in areas with <3.7 snags/acre and conversely 20% of the population would be expected to nest in areas with >3.7 snags/acre.

Snags

Existing Condition

To define the existing condition, snags densities were derived from stand exam plot data collected within the project area. Stand exam data was utilized to define the existing condition for snags across the project area due to the fact that the project area is very small (5,375 acres), this data more accurately displays snag densities compared to the GNN data which is better suited for larger landscapes as identified in the DecAid Advisor. Plot data was collected within each habitat and stand structure type within the Melvin Butte project area. Snag data was extrapolated from stand exam plots and displayed in the size classes identified within the DecAid Advisor: Snags <10 - 19 inches dbh and <20+ inches dbh.

Table 32: Average dead trees per acre by dbh class within the Melvin Butte Project Area.

Size Class	Existing Condition
10-19 inches dbh	9.28 snags/acre
20+ inches dbh	.71 snags/acre

To determine snags densities for wildfires within the Whychus and Deep Canyon watersheds, pre-fire GNN stand structure and composition data was used and associated with the vegetation mortality mapping for those fires. Once vegetation mortality was applied, GNN stand structure and composition data could estimate post fire snag numbers and sizes on all 26,120 of the acres of stand replacement,

mixed severity, and underburned stands throughout the fire area. Please see Appendix 4 for a detailed report of how the analysis was conducted.

Snag habitat will only be provided in the short term. It is estimated that about 75% of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). Once the snags are on the ground there will be a period of time that stand replacement areas have minimal amounts of snags. In the mixed severity areas, trees that survived the Pole Creek Fire will be able to provide snags in the future, so these areas will have a more constant supply of snags in the future

Measure: Snag levels have increased across the landscape due to insect disease and stand replacing fire.

- ***Consistency with the Deschutes LRMP (USDA 1990), Deschutes Wildlife Tree and Log Implementation Strategy (USDA 1994b), and the Northwest Forest Plan (USDA 1994b) snag and green tree retention guidelines.***
- ***The amount of snags that occur within the Whychus and Deep Canyon Watersheds.***

Down Wood

Existing Condition

Logs are an important component on the landscape. They provide organic and inorganic nutrients in soil development, provide microhabitats for invertebrates, plants, amphibians, and other small vertebrates, and provide structure for riparian associated species in streams and ponds. It has been shown that size, distribution, and orientation may be more important than tonnage or volume. Small logs provide escape cover or shelter for small species. It is still unknown what levels of down woody material are needed to provide quality habitat for associated species. (Bull et al. 1997). Tallmon and Mills (1994) have shown that red-backed voles, a primary prey species for the spotted owl, are highly associated with large down material in more advanced decay stages. Truffles, a dietary staple of the northern flying squirrel, have also been loosely associated with down material.

Too much down material may impede travel by big game and present a fire hazard. However, increased levels also provide cover for small invertebrates and may protect seedlings from browse and scorching. Orientation has also been shown to be important. Logs that lie along a contour are used more than those lying across contours. Larger sized logs are also used more and by more species than smaller logs. (Bull et al. 1997).

A variety of species are associated with down wood. Use by species differs in relation to size, decay class, and purpose of use, as well as many other factors. Therefore, by providing for varying densities, sizes, species, and decay classes on the landscape, it will provide for an array of wildlife species. Most available information of wildlife use of downed wood is representative of green stands.

Down wood abundance on the Deschutes National Forest is highly variable due to many factors. The Deschutes National Forest lies on the eastside of the Cascades where there is a limited availability of water and nutrients as compared to the westside of the Cascades. This, combined with overcrowded stand conditions due to fire suppression, has led to tree mortality above historic levels especially within smaller size classes. Plant associations groups that tend to be drier (i.e. ponderosa pine and mixed conifer dry) may recruit higher levels of down wood today than historically.

Measure: Down wood levels have decreased across the landscape due to stand replacing fire, but are expected to increase dramatically in the next 20 years.

- ***Consistency with the Deschutes LRMP (USDA 1990), Deschutes Wildlife Tree and Log Implementation Strategy (USDA 1994b), and the Northwest Forest Plan (USDA 1994b) down wood guidelines.***

Environmental Consequences

Alternative 1 – No Action (Ecological Trend)

There are no known direct impacts to snags, down wood, or green tree replacements (GTRs) under Alternative 1 (No Action). Current fuel continuity due to increased fuel loadings from the past 100 years of fire suppression has put the project area at risk of large fires within the Whychus and Deep Canyon watersheds, there have been 7 large fires since 2002. The Melvin Butte project area is one of the few remaining mid-elevation areas on the Sisters Ranger District that has not burned. Due to the history of the district and small lighting caused fires in or near the project area from 2014 fire season, the likelihood is high for stand replacing fire in this area. These large stand replacement events create snags; however, this pulse of snags is short lived (less than 25 years) and there is a long lag until snags are available on the landscape. In addition, there are limited large trees to provide future large snag habitat. Competition will continue to increase in these overstocked stands and smaller snags are expected to increase across the landscape over time.

Snags are expected to increase over time as insects and disease in overly dense stands continue to cause additional tree mortality at natural levels consistent with increasing levels of inter-tree competition. Down wood levels would be expected to increase as snags continue to fall in the future in the absence of fire. Although a steady recruitment of new snags and logs are expected, they would generally be less than 20" (see Table 32 snag existing condition) dbh size classes, the preferred size class by many species of wildlife. Green tree replacements would also remain at existing levels across the landscape and all trees would continue to be available for use as green tree replacements.

Wildfires may create additional snags and logs beneficial to some woodpecker species. However, there is also risk of a high-intensity stand replacement fire which may reduce current habitat conditions for a larger number of species. In addition, these pulses of post-fire habitat are usually short-lived. Stand resilience to insects, disease, and wildfire is measured by the Upper Management Zone (UMZ). The UMZ relates to the density of trees (basal area, trees per acre, etc.) a forest stand can support without significant mortality from bark beetles. The upper management zone is the density level at which trees begin to come under significant stress and can become susceptible to bark beetles and other insects and diseases. Forest stands managed below the upper management zone are more resilient. There are approximately 4,456 acres that have the potential to receive vegetation treatment. Under the existing condition 92% of these stands are above the Upper Management Zone and are at risk or could be impacted by insects, disease and stand replacing fire due to high stand densities.

Extreme fire hazard equates to high flame lengths and varying degrees of crown fire. Given assumptions made from best available science, extreme and even moderate and high fire hazard would be damaging to valued stand characteristics.

Small diameter down wood will continue to be created as competition for nutrients and water makes trees more susceptible to insects and disease. There are limited large trees $\geq$ 21" dbh available for future large down wood recruitment. Increased stand densities perpetuates the problem of losing large structure over time, which many species require large trees for suitable nesting and foraging habitat. In dense stands increased competition for nutrients will require a longer period of time for the smaller trees to become large trees and utilized by these species. It also allows for fewer available nest sites, which could result in more competition for existing sites between species and lead to greater predation risks. Increased stand densities may increase the risk of loss from fire. Species which require snags for nesting primarily utilize

softer snags (moderate decay), these softer snags would likely be consumed more rapidly with increased fire intensities, leading to large areas of the landscape being unsuitable if such an event were to occur.

The Forest Vegetation Simulator was utilized to model the trend in snag densities by size class over time. Snag densities derived from plot data collect through stand exams were displayed in the existing condition and utilized to model snag densities over time. Snag data was displayed in 10 year increments over a 100 year time period without the presence of fire. It is important to realize that the likelihood of fire occurring in Melvin Butte project area is high. Approximately 42% of the Sisters Ranger District within the elevation zone of the Melvin Butte project has burned since 2002. Table 33 shows the change of snag densities overtime without treatment.

Table 33: FVS modeled snag densities for the existing condition

Year	Snags 10-19 inches dbh	Snags 20+ inches dbh
2014	9.28 snags	0.71
2024	10.44	0.84
2034	10.40	0.86
2044	10.18	1.05
2054	9.65	1.23
2064	9.42	1.44
2074	9.34	1.61
2084	8.70	1.75
2094	7.97	1.83
2104	7.38	1.93

Small diameter snags continue to increase for the first 30 years then precipitously decrease for the next 70 years. However, due to the amount of small diameter trees succumbing to insects and disease, it slightly decreases competition and the number of large snags increase, but by a very slight amount.

The following is a summary of snags **greater than 10 inches** dbh per acre by structure stage and habitat type for snag dependent species. The following Table 34 – 42 summarize snag densities for the Existing Condition within the EMC, PP, and LP habitat by the large, open and small structures classes for the Whychus and Deep Canyon watersheds.

Table 34: Existing Condtion EMC habitat type large structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	82	523	368	436	423	273	2,105
Whychus Creek	960	2,263	1,542	2,309	715	1,145	8,933
Grand Total	1,042	2,786	1,910	2,745	1,138	1,418	11,038

Table 35: Existing Condition EMC habitat type open structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	143	379	192	162	119	350	1,344
Whychus Creek	352	701	994	1,611	1,172	3,671	8,501

Grand Total	494	1,080	1,186	1,773	1,291	4,021	9,845

Table 36: Existing Condition EMC habitat type small structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	365	1,220	1,132	554	563	223	4,057
Whychus Creek	2,328	5,157	1,903	2,216	831	609	13,046
Grand Total	2,694	6,377	3,036	2,770	1,394	833	17,103

Table 37: Existing Condition PP habitat type large structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	175	977	43	17	37	6	1,255
Whychus Creek	2,503	2,928	49	48	59	93	5,679
Grand Total	2,677	3,904	92	66	97	99	6,934

Table 38: Existing Condition PP habitat type open structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	155	119	48	35	222	359	938
Whychus Creek	813	293	95	106	164	195	1,665
Grand Total	969	412	143	140	385	554	2,603

Table 39: Existing Condition PP habitat type small structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	4,404	520	75	17	148	24	5,188
Whychus Creek	16,156	8,643	572	93	67	49	25,581
Grand Total	20,560	9,164	647	109	215	73	30,768

Table 40: Existing Condition LP habitat type large structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	4	69	417	332	215	159	1,196
Whychus Creek	246	532	482	602	183	66	2,111
Grand Total	250	601	900	934	398	225	3,307

Table 41: Existing Condition LP habitat type open structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	49	54	73	52	7	547	781
Whychus Creek	177	222	364	294	269	1,453	2,779
Grand Total	225	275	437	346	276	2,000	3,560

Table 42: Existing Condition LP habitat type small structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	169	629	1,851	1,122	1,238	183	5,192
Whychus Creek	2,134	2,622	914	1,421	369	248	7,708
Grand Total	2,303	3,251	2,765	2,542	1,608	431	12,900

The following Table 43-51 summarizesnag densities **greater than 10 inches dbh** for the Existing Condition by percent (%) of the Whychus and Deep Canyon watersheds within the EMC, PP, and LP habitat by the large, open and small structures classes for the Whychus and Deep Canyon watersheds.

Table 43: Existing Condition percent of watershed in EMC habitat type large structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	4	25	17	21	20	13
Whychus Creek	11	25	17	26	8	13
Total	9	25	17	25	10	13

Table 44: Existing Condition percent of watershed in EMC habitat type large structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	11	28	14	12	9	26
Whychus Creek	4	8	12	19	14	43
Total	5	11	12	18	13	41

Table 45: Existing Condition percent of watershed in EMC habitat type open structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	9	30	28	14	14	6
Whychus Creek	18	40	15	17	6	5
Total	16	37	18	16	8	5

Table 46: Existing Condition percent of watershed in PP habitat type small structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	14	78	3	1	3	0
Whychus Creek	44	52	1	1	1	2
Total	39	56	1	1	1	1

Table 47: Existing Condition percent of watershed in PP habitat type open structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	17	13	5	4	24	38
Whychus Creek	49	18	6	6	10	12
Total	37	16	5	5	15	21

Table 48: Existing Condition percent of watershed in PP habitat type small structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	85	10	1	0	3	0
Whychus Creek	63	34	2	0	0	0
Total	67	30	2	0	1	0

Table 49: Existing Condition percent of watershed in LP habitat type large structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	0	6	35	28	18	13
Whychus Creek	12	25	23	29	9	3
Total	8	18	27	28	12	7

Table 50: Existing Condition percent of watershed in LP habitat type open structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	6	7	9	7	1	70
Whychus Creek	6	8	13	11	10	52
Total	6	8	12	10	8	56

Table 51: Existing Condition percent of watershed in LP habitat type small structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	3	12	36	22	24	4
Whychus Creek	28	34	12	18	5	3
Total	18	25	21	20	12	3

Alternative 2 and 3- Direct and Indirect Effects

Snags

Under Alternatives 2 and 3, the Melvin Butte project proposes thinning from below (HTH), mixed conifer thinning from below with group openings (MCGO), mixed conifer thinning form below without group opening (MC-No Group Openings), ponderosa pine with dwarf mistletoe, non-commercial thinning (P), prescribed burning only (B), lodgepole pine improvement harvest (LPI), and Scenic Views Enhancement.

Table 52: Total acres of treatment associated with each alternative by treatment type.

Treatment Type	Alternative 2	Alternative 3
B	933	933
HTH	1,008	1,169
MC – No Group Opening		820
MCGO	840	
LPI	249	445
Dwarf Mistletoe	160	
P	1,179	1,179
Scenic Views Enhancement	241	241
Total Acres.	**4,610**	**4,787**

Large snags are not proposed for removal as part of the treatments under any of the action alternatives. Minor incidental loss of snags may occur during treatments due to OSHA requirements for removal of danger trees during operations; however these are incidental and would occur randomly throughout the project area, not affecting snag patches. Snags ≥ 10 inches dbh that are determined to be safety hazards will be felled and left as down wood. The majority of hazard tree abatement will likely occur within the Scenic Views Enhancement treatment area, since it overlaps the Pole Creek Fire. Hazard tree abatement will be occur on a site specific basis and will impact far less than 1% of existing snags.

Lodgepole pine and white-fir snag numbers would be slightly reduced from current levels due to harvesting of standing dead lodgepole pine and white-fir within approximately 249 acres associated with Lodgepole Improvement Harvest (LPI) and approximately 241 acres of Scenic Views Enhancement treatment. Within the LPI units, stands have been heavily impacted by mountain pine beetle outbreaks and due to stress from site competition multiple diseases affecting the white-fir such as mistletoe, root rot, and fir engraver. Treatments will remove dead and dying trees to reduce fuel concentrations around green trees. Stand densities will be reduced, minimizing the likelihood of continued bark beetle outbreaks enhancing the longevity of the residual green trees by removing diseased trees. The Scenic Views Enhancement treatments occur along the 16 road corridor and are associated with primarily lodgpole pine and some mixed conifer. During the Pole Creek Fire, this portion of the 16 road received stand replacing and mixed mortality fire. The road corridor is within the Scenic Views land allocation identified under the Deschutes Land and Resource Management Plan. The objective of this treatment are to enhance the scenic quality of the road corridor by removing concentration of small diameter fire killed trees retaining all live trees as well as all large snags. Treatment will enhance the visual quality along the road corridor while retaining snag habitat providing opportunities for cavity nesting habitat and watchable wildlife (LRMP M9-79,80, 81).

Alternatives 2 and 3 proposed understory treatments including non-commercial thinning, whip falling, and/or ladder fuel reduction and prescribed burning across all habitat types (ponderosa pine, mixed conifer, and lodgepole pine) and associated with all treatment types. Although thinning will not target snag removal, prescribed burning could inadvertently recruit existing snags as down logs and recruit snags from residual green trees. These activities could have minor short-term impacts to snags, logs, and GTRs, but may have some beneficial impacts to these habitat components in the long-term by creating stand conditions that would accelerate and develop larger tree structure and future snags and logs, than if these small trees were not thinned.

In areas identified for thinning, canopies will be opened up and stand densities reduced to lessen the risk of a large-scale event (insects, disease, or fire). Thinning will directly reduce canopy cover, but it will also reduce the fire risk to individual stands by breaking up the fuel continuity across the project area, reducing the continuation of these disturbance events. Under Alternative 2, within MCGO treatment, small group opening will be created from 1 to 3 acres in size where the unhealthy white-fir dominates the

stand. These group openings will be planted to ponderosa pine to increase the stands resilience to insects, disease and fire. In the short-term, due to the removal of unhealthy white-fir, there will be lower recruitment of white-fir snags in these areas but treatments will retain all healthy white-fir and ponderosa pine promoting vigor and accelerating the development of large tree structure throughout these stand. As a result, larger snags will be recruited in the long-term, which have the potential to be utilized by a much larger variety of species dependent on dead wood habitat.

Thinning is expected to reduce down wood recruitment in the short-term; however in the long-term it is anticipated that there will be more large trees that can be recruited into down wood.

In addition, removal of understory in overstocked stands will decrease the competition for nutrients and water, which is anticipated to lower the susceptibility of the trees to insects and disease (Cochran and Barret 1999). Currently there are a limited number of large snags and trees available as well as replacement large trees. Many of the future large trees and snags are within overstocked stands, which will increase the amount of time the trees will take to get to the desired size and height. Thinning overstocked stands will reduce competition which should increase growth rates to the remaining trees. Sufficient recruitment of future large down wood from currently smaller green trees is of concern. Many are in overstocked stands which will increase the time it takes the trees to reach larger size and height. Cochran and Barret (1999) showed that 30 years after thinning on the Deschutes National Forest there were large differences in average tree sizes among different group stocking levels. They also showed that the growth rates of the 20 largest diameter trees per acre were reduced by competition from smaller trees.

Fuels treatments in the project area will break up the fuel continuity and reduce the risk of a large fire event, which should reduce the risk to individual large snags and trees. Effects to snags from prescribed underburning are similar for both alternatives with similar acres proposed under Alternative 2 and 3 (933 acres). Mortality of snags in ponderosa pine habitat during prescribed fire treatments in Arizona and California ranged from 20% (Randall-Parker and Miller 2002), 45% (Horton and Mannan 1988), and 56% (Bagne et al. 2008). All three studies found that larger diameter ponderosa pine trees were least likely to die, at least in the short-term. Horton and Mannan (1988) found a 20-fold increase in abundance of snags < 15 cm dbh and showed evidence of woodpecker foraging use in southeastern Arizona. Several studies showed that the highest snag losses were in areas where a long period of fire exclusion had occurred (Bagne et al. 1988, Holden et al. 2006). Bagne et al. (2008) and Horton and Mannan (1988) found that re-entry burns had a much lower mortality rate for snags, presumably because the trees that did not burn during the first entry were more resilient. Loss of snags from prescribed fire was partially mitigated by the creation of new snags (Horton and Mannan 1988, Bagne et al. 2008). It is anticipated in the Prescribed Burn Only (B) treatments that snags will be lost from operation. This should also be partially mitigated by the recruitment of larges snags since there is a large component of old growth associated with this treatment type.

Fuels treatments will reduce the understory complexity, which could lower small mammal densities. A reduction in small mammal populations could minimize predation pressures on white-headed woodpeckers, thereby benefitting this species.

Within the areas that have prescribed fire identified, there is also potential of changing large snags into down wood. Burning prescriptions and pre-ignition fuels reduction should reduce the chance of losing large snags. However, it is assumed that some large snags would be consumed during prescribed fire operations.

Down wood that is on the ground is at risk of being consumed by the proposed prescribed fire treatments. Randall-Parker and Miller (2002) found that 50% of the down logs were consumed in the Arizona prescribed fires. Horton and Manann (1988) found that the number and volume of ponderosa pine logs decreased by 42% and 56% respectively after prescribed fire (both fall and spring burns). Preferred avian foraging sites before burning (logs with sapwood) were proportionately less numerous after the prescribed fire (Hortona and Manann 1988).

In areas that do not have prescribed fire as part of the treatments, all current down wood will remain.

By reducing both activity fuels and overall fuel loadings, prescribed burning, and mastication treatments for both alternatives is anticipated to increase stand resiliency to wildfire and reduce competition with established trees in the long-term.

Within the mixed conifer habitat type, high down log densities were identified in EA unit 57 due to high levels of bark beetle mortality associated with the lodgpole pine. Some of the logs occur as natural recruitment, but many are human created from personal use firewood cutting. The down wood densities are such that it creates a barrier for equipment to access the unit and implement thinning prescriptions, and also creates areas of high fuel concentration. To effectively treat these stands, down wood will be removed from these areas to allow equipment access. However, down wood will be retained to meet NWFP standards for Matrix lands at 120 lineal feet per acre.

Approximately 775 acres of the project area will remain as untreated stands, retaining high stocking densities providing habitat for interior forest species. These denser (untreated) forest patches will act as part of the greater landscape mosaic. These areas will have a higher stocking rate and will provide some diversity of canopy cover across the landscape. Due to high tree densities these areas will recruit high level of snags and down woody material.

In untreated habitat there will continue to be an increased risk from disturbance, although breaking up the fuel continuity across the landscape will reduce the risk of a larger scale disturbance events. In addition, some of the areas identified for no treatment occur within higher site potential areas, which allow them to produce large trees with greater canopy closure. These areas have the potential to provide large snags and down woody material in the short-term.

FVS was used to modeled and compare snag recruitment overtime between the No Acton Alternative/Existing Condition and the Action Alternatives. Stand exam plot data was utilized to determine snag numbers within treatment types. Snag data was modeled on 10 year increments over a 100 years. The following Table 53 and 54 displays the average snag density over time by treatment type and size class.

Table 53: Snags per acre for Alternative 2 modeled on 10 year increments by treatment type.

	DM Alt 2 (snags/acre)		MCGO Alt 2 (snags/acre)		HTH Alt 2 (snags/acre)		P Alt 2 (snags/acre)		Burn Alt 2 (2008-2088) (snags/acre)		LPI Alt 2 (snags/acre)	
Year	10-19″ dbh	20″+ dbh	10-19″ dbh	20″+ dbh	10-19″ dbh	20″+ dbh	10-19″ dbh	20″+ dbh	10-19″ dbh	20+	10-19″ dbh	20″+ dbh
2014	8.048	0.814	10.434	1.712	72.660	12.504	4.636	0.822	6.662	0.790	9.456	0.258
2024	1.177	0.245	8.047	1.705	34.272	9.672	0.439	0.134	27.255	1.416	1.172	0.058
2034	0.931	0.244	7.277	1.748	31.055	11.347	0.470	0.224	4.968	0.776	1.584	0.083
2044	0.804	0.255	7.157	1.828	26.891	13.013	0.506	0.337	4.864	0.938	1.553	0.099
2054	1.121	0.304	6.988	1.940	22.457	14.718	0.867	0.455	4.402	1.155	1.680	0.133
2064	2.120	0.352	6.734	2.129	18.205	16.066	2.213	0.542	3.873	1.398	1.920	0.178
2074	2.987	0.374	6.651	2.415	14.218	16.923	3.147	0.590	3.243	1.633	2.247	0.246
2084	2.796	0.384	6.201	2.778	11.322	17.237	3.595	0.634	2.639	1.883	2.803	0.319
2094	2.565	0.376	5.740	3.131	9.310	17.087	3.534	0.667	2.146	2.151	3.375	0.375
2104	2.222	0.382	5.503	3.482	7.395	16.502	3.263	0.696	6.754	0.807	3.268	0.427

Table 54: Snags per acre for Alternative 3 modeled on 10 year increments by treatment type.

	MC - No Openings Alt 3 (snags/acre)		PCT Alt 3 (snags/acre)		Burn Alt 3 (2008-2088) (snags/acre)		LPI Alt 3 (snags/acre)		HTH Alt 3 (snags/acre)	
Year	10-19" dbh	20"+ dbh	10-19" dbh	20"+ dbh	10-19" dbh	20"+ dbh	10-19" dbh	20"+ dbh	10-19" dbh	20"+ dbh
2014	10.43	1.71	4.636	0.822	6.662	0.790	9.456	0.258	57.970	10.018
2024	8.05	1.71	0.439	0.134	27.255	1.416	1.172	0.058	28.153	8.091
2034	7.28	1.75	0.470	0.224	4.968	0.776	1.584	0.083	25.675	9.148
2044	7.16	1.83	0.506	0.337	4.864	0.938	1.553	0.099	22.477	10.506
2054	6.99	1.94	0.867	0.455	4.402	1.155	1.680	0.133	18.919	11.915
2064	6.73	2.13	2.213	0.542	3.873	1.398	1.920	0.178	15.474	13.043
2074	6.65	2.41	3.147	0.590	3.243	1.633	2.247	0.246	12.241	13.791
2084	6.20	2.78	3.595	0.634	2.639	1.883	2.803	0.319	9.937	14.074
2094	5.74	3.13	3.534	0.667	2.146	2.151	3.375	0.375	8.291	13.989
2104	5.50	3.48	3.263	0.696	6.754	0.807	3.268	0.427	6.636	13.533

Within approximately 160 acres associated with Dwarf mistletoe, heavily infected trees will be selected in both the overstory and understory for removal. Some trees greater than 21 inches in these stands will be identified for removal, some will be girdled to contribute toward snag habitat. Trees over 21 inches that have low levels of mistletoe will be retained and the mistletoe pruned away. Although snags are not targeted for removal, those that currently exist will have been recruited as down wood within the first 10 years. The DM units are young stands of ponderosa pine; due to the age of the stands and lack of large trees, the majority of snags recruited within the next 90 years will be small to medium sized. Snags in the large size class (greater than 20 inches dbh) are slow to recruit, but also increase over the next 90 years post treatment.

The majority of snags in the project area exist within approximately 840 acres associated with the MCGO treatment and approximately 1,008 acres associated with the HTH treatments. Both treatments thin from below in a mosaic fashion within mixed conifer and ponderosa pine stands. These treatments do not target snags for removal and the objective for both treatment types are to promote fire resistant Late and Old structure stands while retaining late and old structure components. These treatment objectives will; reduce stand densities which will promote tree vigor by reducing site competition for resources, reduce the risk of stand replacing fire, and promote the development of Late and Old Structure (LOS) stands which includes large snags. Trees selected for removal within the MCGO treatment will primarily be white-fir and lodgepole pine. Small group openings (<3 acres in size) will be created in areas void of ponderosa pine and dominated by white-fir that are fading from insects and disease. Stands within HTH treatment are ponderosa pine dominated and white-fir will be selected for removal unless it is not directly competing with ponderosa pine; treatments will promote the largest and healthiest ponderosa pine in these stands. From the modeled snag data within the first 10 years, snag densities decline. Over the next 90 years, there are fewer smaller snags and more large snags over 20 + inches dbh per acre as a result of the development of late and old structure habitat.

Within approximately 1,179 acres of PCT units, these areas consist of 20 to 40 year old ponderosa pine plantations where very few snags exist. Treatment will thin stands in a mosaic fashion trying to force some heterogeneity into these planted areas. No snags are targeted for removal, due to the size and age of these plantations, the modeled data show that the majority of snags are small to medium sized. Within the first many of these small to medium snags are recruited as down wood, but as predicted, due to thinning and the reduction of site competition, snag recruitment increase at about year 40.

The approximately 933 acres of Burn only treatment occur within stands dominated by LOS ponderosa pine or are classified as LOS due to stand characteristics. Within the first 10 years following treatment there is a large increase in small and medium snags and a slight increase in large snags. Within the following 20 years post treatment, the majority of the small and medium snags have been recruited as

down wood, and over the remaining 100 years snag levels are recruited to similar levels consistent to those levels associated with the existing condition.

LPI treatment will occur on approximately 249 acres. This area has been impacted by a mountain pine beetle outbreak over the past 15 years. Treatments are focused to remove dead and dying lodepole pine and white-fir within residual green stands to reduce fuel loadings and disease. In review of the modeled data, the small and medium snags will be greatly reduced in this area within the first 10 years from treatments as well as recruitment into down wood. Within the next 100 years, snag densities recover due to the 100 year cycle of the development of lodgepole pine. Due to the size of lodgepole pine, very few mature trees reach 20 inches dbh and therefore snag densities in this size class stay consistently low over the 100 year period.

Alternative 3 was developed based on key issues identified during public scoping. Key issues consisted of not creating group opening treatments in the mixed conifer thinning units and not removing large ponderosa pine in dwarf mistletoe treatments. Dwarf mistletoe treatments were combined with HTH (thinning from below) and mixed conifer thinning from below will not have any group openings. The outcome of each treatment and snag recruitment modeled over 100 years is the same as Alternative 2. The major differences in the two alternatives are under Alterative 3, snag densities for year 2014 for the HTH treatment are much lower and snag recruitment for MC-no group openings is much higher over time. Under Alternative 3, the dwarf mistletoe treatment will not be accomplished, and as a result will just be thinned from below and were lumped in with the HTH units. Snag densities are low in the DM units and when lumped with HTH treatments in Alternative 3 it brought the overall snags per acre down. However, the HTH treatment and projected snag recruitment is consistent with Alternative 2. Within the MC-no group openings, since there will be no group openings created that remove insect and disease ridden white-fir pockets, those trees will be recruited as snags over time. Therefore, creating a high recruitment of white-fir snags throughout the 100 year period.

Overall, under each alternative the project does not propose target the removal of snags. The only down wood that is proposed for removal occurs in EA unit 57 and will occur under both action Alternatives. Retention of down wood will occur to meet the NWFP standards and guides. Alternative 3 is the more conservative of the two action alternatives, it will recruit more snags consistently through time on a unit by unit basis. Alternative 2 is a more proactive approach to address insects and disease as well as developing more fire resistant stands in the future. However, on a snag level basis there is a small margin of difference between alternatives and snags per acre recruited overtime. Due to the small size of the project area as well as treatment units and the fact that dead wood is not specifically targeted for removal, the project will have very minor effect to snags and coarse woody debris as a result of Melvin Butte project.

Cumulative Effects - Alternative 2 and Alternative 3

The cumulative effect analysis for snags and down wood is completed at both the Whychus and Deep Canyon 10th field watershed. Due to the fact that the Pole Creek Fire over laps the Melvin Butte project area and both Whychus and Deep canyon watersheds, both watersheds will be used to measure the incremental impacts from the Melvin Butte project with ongoing and future foreseeable projects, to determine cumulative effects to snags and down wood.

The last 100 years of fire suppression has changed stand composition across the Sisters Ranger District. Stand densities have increased as well as outbreaks of insects and disease, although both are endemic to the district. As a result of disturbance large tracks of mortality exist in stands across the district. Since 2002 a series of uncharacteristically large wildfires created large areas of stand replacement across the district. From 2002 to the present, approximately 44% of the district land base has been affected by wildfire.

Activities identified in Table 1 were reviewed to assess whether, in combination with the likely impacts of the Melvin Butte project, there would be any cumulative impacts to snags and down wood. Eastside mixed conifer stands within the Whychus and Deep Canyon 10th field watersheds is being used the zone of influence to measure cumulative effects for this analysis. Based on that review, the potential cumulative impacts are those discussed below.

Table 55 displays large wildfires which have occurred within the Whychus Watershed - Black Crater, Lake George, Black Butte 2, and Rooster Rock. Deep Canyon Watershed – Two Bulls Fire.

Table 55: Recent Fire History in the Whychus and Deep Canyon Watersheds

Fire	Date	Acres of National Forest Land
Cache	2002	40
Black Crater	2006	5,147
Lake George	2006	1,857
GW	2007	186
Black Butte 2	2009	559
Rooster Rock	2010	1,362
Pole Creek	2012	26,120
Two Bulls	2014	487
Total		35,758

Approximately 1,642 acres have been salvaged within these fires equaling approximately 4%.

The Pole Creek Fire Danger Tree Removal project, Pole Creek Fire Timber Salvage project, and Two Bulls Timber Salvage projects total approximately 1,584 acres. These are ongoing and future projects that will and have removed fire killed trees reducing snag densities within the watersheds reducing snag habitat in the watersheds.

Activities proposed under the Sisters Area Fuels Reduction (SAFR) project, Glaze Forest Restoration project, Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, Bear Wallow Fire Wood project have occurred or will occur in the two watersheds. Fuels reduction treatments focus on removing dead lodgepole pine among green stands to reduce fuel loading. The SAFR and Glaze projects all focus on thinning from below to restore and enhance ponderosa pine conifer stands while reducing the risk of stand replacing fires. These treatments do not propose the removal of snags or down woody material. The Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, Bear Wallow Fire Wood projects are all within mixed conifer or lodgepole pine habitat types. These areas are associated with high levels of bark beetle mortality to lodgepole pine stands. These project areas will directly remove snags to break of fuel continuity within these areas and therefore will reduce snag and log habitat. Overall these project will reduce fuel densities on approximately 21,507 acres. These projects are being implemented to reduce the risk of loss of existing habitat from future large-scale disturbances.

Personal use firewood cutting is occurring within the 3,029 acre Three Creek's Firewood Cutting area. Individual dead trees are being removed by personal use firewood cutters primarily within the road prism of open roads. Cutting is not wide spread and occurs on a site specific basis, where individual trees are removed or small groups of dead trees. Only dead lodgepole pine and white-fir can be taken for firewood.

Private lands are not managed for snag habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental.

The following tables display the change in snag densities by habitat type for snags greater than 10 inches dbh across the Whychus and Deep Canyon watersheds as a result the Melvin Butte project.

The following is a summary of snags per acre **greater than 10 inches dbh** by structure stage and habitat type for snag dependent species. The following Table 56 – 64 summarize the **changes to snag densities** as a result of Alternative 2 and 3 within the EMC, PP, and LP habitat by the large, open and small structures classes for the Whychus and Deep Canyon watersheds.

Table 56: Alternative 2 and 3 EMC habitat type large structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	82	534	368	433	423	266	2,106
Whychus Creek	960	2,275	1,542	2,307	714	1,134	8,932
Grand Total	1,042	2,809	1,910	2,740	1,137	1,400	11,038

Table 57: Alternative 2 and 3 EMC habitat type open structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	143	420	192	160	115	315	1,345
Whychus Creek	350	1,574	958	1,551	1,047	3,020	8,500
Grand Total	493	1,994	1,150	1,711	1,162	3,335	9,845

Table 58: Alternative 2 and 3 EMC habitat type small structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	365	1,221	1,132	554	563	222	4,057
Whychus Creek	2,328	5,180	1,902	2,211	828	596	13,045
Grand Total	2,693	6,401	3,034	2,765	1,391	818	17,102

Table 59: Alternative 2 and 3 PP habitat type large structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	175	977	43	17	37	6	1,255
Whychus Creek	2,503	2,928	49	48	59	93	5,680
Grand Total	2,678	3,905	92	65	96	99	6,935

Table 60: Alternative 2 and 3 PP habitat type open structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	155	119	48	35	222	359	938
Whychus Creek	813	300	95	105	164	188	1,665
Grand Total	968	419	143	140	386	547	2,603

Table 61: Alternative 2 and 3 PP habitat type small structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	4,404	520	75	17	148	24	5,188
Whychus Creek	16,157	8,644	572	93	67	48	25,581
Grand Total	20,561	9,164	647	110	215	72	30,769

Tabel 62: Alternative 2 and 3 LP habitat type large structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	4	69	417	332	215	159	1,196
Whychus Creek	246	532	482	602	183	66	2,111
Grand Total	250	601	899	934	398	225	3,307

Table 63: Alternative 2 and 3 LP habitat type open structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	49	54	73	52	7	547	782
Whychus Creek	177	251	364	293	262	1,432	2,779
Grand Total	226	305	437	345	269	1,979	3,561

Table 64: Alternative 2 and 3 LP habitat type small structure

Snags Per Acre	0	0-15	15-30	30-60	60-90	>=90	Total
Deep Canyon	169	629	1,851	1,122	1,238	183	5,192
Whychus Creek	2,134	2,627	913	1,420	368	246	7,708
Grand Total	2,303	3,256	2,764	2,542	1,606	429	12,900

The following Table 65-73 summarize the **changes to snag densities** for snags **greater than 10 inches dbh** from alternative 2 and 3 by percent (%) of the Whychus and Deep Canyon watersheds within the EMC, PP, and LP habitat by the large, open and small structures classes for the Whychus and Deep Canyon watersheds.

Table 65: Alternative 2 and 3 percent of watershed in EMC habitat type large structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	4%	25%	17%	21%	20%	13%
Whychus Creek	11%	25%	17%	26%	8%	13%
Total	9%	25%	17%	25%	10%	13%

Table 66: Alternative 2 and 3 percent of watershed in EMC habitat type open structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	11%	28%	14%	12%	9%	26%
Whychus Creek	4%	8%	12%	19%	14%	43%
Total	5%	11%	12%	18%	13%	41%

Table 67: Alternative 2 and 3 percent of watershed in EMC habitat type small structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	9%	30%	28%	14%	14%	6%
Whychus Creek	18%	40%	15%	17%	6%	5%
Total	16%	37%	18%	16%	8%	5%

Table 68: Alternative 2 and 3 percent of watershed in PP habitat type large structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	14 %	78 %	3 %	1 %	3 %	0 %
Whychus Creek	44 %	52 %	1 %	1 %	1 %	2 %
Total	39 %	56 %	1 %	1 %	1 %	1 %

Table 69: Alternative 2 and 3 percent of watershed in PP habitat type open structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	17 %	13 %	5 %	4 %	24 %	38 %
Whychus Creek	49 %	18 %	6 %	6 %	10 %	11 %
Total	37 %	16 %	5 %	5 %	15 %	21 %

Table 70: Alternative 2 and 3 percent of watershed PP habitat type small structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	85 %	10 %	1 %	0 %	3 %	0 %
Whychus Creek	63 %	34 %	2 %	0 %	0 %	0 %
Total	67 %	30 %	2 %	0 %	1 %	0 %

Table 71: Alternative 2 and 3 percent of watershed LP habitat type large structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	0 %	6 %	35 %	28 %	18 %	13 %
Whychus Creek	12 %	25 %	23 %	29 %	9 %	3 %
Total	8 %	18 %	27 %	28 %	12 %	7 %

Table 72: Alternative 2 and 3 percent of watershed LP habitat type open structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	6 %	7 %	9 %	7 %	1 %	70 %
Whychus Creek	6 %	9 %	13 %	11 %	9 %	52 %
Total	6 %	9 %	12 %	10 %	8 %	56 %

Table 73: Alternative 2 and 3 percent of watershed LP habitat type small structure

Snags Per Acre	0	0-10	10-20	20-30	30-60	>=60
Deep Canyon	3 %	12 %	36 %	22 %	24 %	4 %
Whychus Creek	28 %	34 %	12 %	18 %	5 %	3 %
Total	18 %	25 %	21 %	20 %	12 %	3 %

Overall, Alternatives 2 and 3 do not target snags for removal. Within LPI treatments on approximately 249 acres under Alternative 2 and 445 acres under alterative 3, there is the potential for individual lodgepole pine and white-fir snags to be removed. This treatment will reduce fuel loadings in areas adjacent to healthy stands and will focus on the removal of unhealthy trees that are fading from residual mountain pine beetle attack and disease. Total area treated is very small on the landscape and total snags removed are minor at a watershed scale. Cumulatively, as a result of Alternative 2 and Alternative 3 there is no change to snag densities as it relates to the overall snags per acre for the watersheds as well as the percent of the watershed for each habitat type as displayed in the existing condition and this cumulative effect section (See Table 56-73 above). Since snags are only targeted for removal on 240 acres of Scenic Views treatment, the percent of snags reduction on the watershed scale is not measureable and is a minor impact.

The following Table 74 display estimated acres by quality of habitat for snag dependent species after the proposed treatments for Melvin Butte within the Whychus Creek and Deep Canyon Watersheds. Quality of habitat is based on DecAid tolerance level and associated snag densities. Please see Appendix 4 for a detailed report of how the analysis was conducted and the existing condition for habitat quality.

Table 74: Comparison of habitat for species post Melvin Butte Treatments

Species	0-30% Poor Quality	>30-50% Low Quality	>50-80% Moderate Quality	>80% High Quality	Grand Total
American Marten	266,230	28,008	25,988	123,088	443,314
Black Backed Wood Pecker	429,942	149,257	50,378	28,526	658,103
Cavity Nesting Birds	316,492	46,795	7,988	5,662	376,938
Hairy Woodpecker	232,395	142,230	1,410	903	376,938
Pileated Woodpecker	583,976	45,890	14,162	14,075	658,103
Pygmy Nuthatch	375,737	99,878	75,101	107,388	658,103
White-headed Woodpecker	269,801	147,231	60,970	180,100	658,103
Williamson's Sapsucker	582,173	46,110	15,745	14,075	658,103

Conclusion

Cumulatively under Alternatives 2 and 3 no snags are targeted for removal. Incidental removal will occur where fuels loading and overall stem density reduction is occurring around healthy stands of trees. Targeted tree removal in these areas will be trees that are fading from residual bark beetle out breaks and disease issue. This treatment will occur on approximately 249 acres under Alternative 2 and approximately 445 under Alternative 3 within Lodgepole Improvement treatment. Within the Scenic views treatments to meet Deschutes Forest Plan Standards and Guides, small fire killed trees will be removed on approximately 240 acres to enhance foreground visual objective along the 16 road.

The Whychus and Deep Canyon Watershed has been highly impacted by wildfire, high snag densities currently exist within these watersheds. Over time within these post fire areas, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. Dahms (1949) found 10 years post-fire, 50% of fire killed ponderosa pine snags remained standing but this declined to 22% standing after 22 years. It is estimated that about 75% of all snags may fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). Treatments proposed for Melvin Butte will promote the development Late and Old structure habitat and reduce the risk of wildfire to these watersheds. The Melvin Butte project will retain full stock stands to recruitsnags individually over time. With the ongoing forest management projects within the Whychus and Deep Canyon Watersheds by comparing the snags per acre by habitat type across both watersheds there will be less than a 1% reduction in overall snag habitat. Implementation of this project will not incrementally contribute to a change in viability of dead wood habitat on the Deschutes National Forest.

Consistency with the Deschutes LRMP, Deschutes Wildlife Tree and Log Strategy, and the Northwest Forest Plan

Wildlife standards and guidelines WL-37 and WL-38 will be assessed. The project is consistent with the Deschutes LRMP, the Deschutes Wildlife Tree and Log Strategy, and the Northwest Forest Plan.

Source Document	Standard & Guideline or Management Recommendation	Doesn't Meet, Meets, Exceeds, or Does Not Apply	Rationale
Northwest Forest Plan	Retain snags at levels to meet 100% of potential population levels for white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl.	Meets	Snags are not targeted for removal with this project. However incidental removal could occur within the Lodpole Improvement units as well as Scenic View Enhancement units. All large snags will be retain >20 inches dbh, target snag levels are expected to exceed 100% potential population levels.
	Provide Green Tree Replacements to meet the 100% of potential population levels for white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl.	Meets	The project will implement primarily thinning from below retaining fully stocked stand. Residual stand densities will exceed target stand densities to meet 100% potential population levels.
	Within Matrix lands a minimum of 120 linear feet of logs per acre greater or equal to 16 inches	Meets or Exceeds	Down wood is not targeted for removal except where it will interfere with mechanical thinning. In

	diameter and 16 feet long should be retained.		these situations down logs will be maintained to meet NWFP S&G's
Deschutes NF LRMP – Wildlife Tree and Log Strategy	Retain snags of various sizes to meet at least 40% of potential population levels in matrix and 100% of potential population levels in LSR by PAG	Meets	Snags are not targeted for removal.
	Provide Green Tree Replacement to meet at least 40% of potential population levels in matrix and 100% of potential population levels in LSR by PAG	Meets	The project will implement primarily thinning from below retaining fully stocked stand. Residual stand densities will exceed target stand densities to meet 100% potential population levels.

Mitigation Measures

1. EA Unit 57, maintain down log densities at 120 lineal feet per acre with a minimum of 16 inches diameter and 16 feet long (NWFP C-40).
2. Where incidental removal of snags occurs to meet objectives for fuel loading within LPI units and scenic views management all snags >21 inches dbh will be retained.

Recommendations: None

Northwest Forest Plan Species of Concern: Bats

Measure: Roosting and foraging habitat impacted

The Northwest Forest Plan calls for retaining snags, decadent trees, and green tree recruitment for roosting bats in Matrix and Adaptive Management Areas (Page B-7, Stand Management):

"Adequate numbers of large snags and green trees are especially critical for bats because these trees are used for maternity roosts, temporary night roosts, day roosts, and hibernacula. These should be well distributed throughout the matrix because bats compete with primary excavators and other species that use cavities. Day and night roosts are often located at different sites, and migrating bats may roost under bark in small groups. Thermal stability within a roost site is important for bats, and large snags and green trees provide that stability. Individual bat colonies may use several roosts during a season as temperature and weather conditions change. Large, down logs with loose bark may also be used by some bats for roosting."(NWFP 1994)

Snag densities are poorly known for most species of bats but some research indicates that snag density requirements may be higher than those needed for woodpeckers (Lacki et al. 2008). Bats frequently switch roosts to escape predation and avoid parasites (Lewis 1995, Barclay and Kurta 2007).

Table 75 lists 11 species of bats with habitat on the Deschutes National Forest and potentially occurring in the project area.

Table 75: Bat Species Potentially Occurring in the Melvin Butte project area.

Bat Species Potentially Occurring in the Project Area			
Species	PAG	Roost Substrate	Potential Presence (Yes/No)
Long-eared myotis	Mixed conifer and ponderosa pine	Large hollow trees, snags, loose bark, crevices, rock outcrops, bridges, buildings, caves	Yes
Fringed myotis	Ponderosa pine	Trees, snags, buildings, caves, rocks, cliffs and bridges	Yes
Long-legged myotis	Mixed conifer, ponderosa pine	Trees, snags, buildings, caves, rocks, cliffs and bridges	Yes
Little brown myotis	Mixed conifer, ponderosa pine, desert	Trees, snags, buildings, caves, rocks, cliffs and bridges	Yes
California myotis	Mixed conifer, ponderosa pine, desert	Arid habitat, rocky outcrops, caves, bridges	Yes
Yuma myotis	Mixed conifer, ponderosa pine, desert	Trees, snags, buildings, caves, rocks, cliffs and bridges; highly associated with water	Yes
Small-footed myotis	Mixed conifer, Ponderosa pine, desert	Loose bark on trees and snags, crevices, cliffs, caves, mines, building	Yes
Big brown bat	Mixed conifer, ponderosa pine, desert	Trees, snags, buildings, caves, rocks, cliffs and bridges	Yes
Canyon bat	Ponderosa pine, desert	Arid habitat, rocky outcrops, caves, bridges	Low potential
Silver-haired bat	Ponderosa pine	Under bark in large snags, bridges, buildings	Yes
Hoary Bat	Mixed conifer	Green foliage and branches	Yes
Townsend's big-eared bat	Ponderosa pine, desert.	Highly associated with caves but sometimes uses hollow trees in ponderosa pine forests, lava, bridges, and buildings	Yes
Pallid bat	Ponderosa pine, desert	Arid habitat, coniferous forests, rocky outcrops, caves, bridges	Yes
Spotted bat	Ponderosa pine fringe, desert	Highly associated with vertical cliff habitat	No

Snag Habitat and Impacts From Fire

Little is known about the roosting ecology of bats and their prey in burned forests. Limited research has focused on short-term bat foraging activity in burned areas with varying types of severity (Hayes 2009, Buchalski et al. 2013). In general, low intensity wildfires and prescribed fire create relatively few snags (Horton and Mannan 1988) and many are small diameter, which are of less use for most roosting bat species which usually prefer large-diameter (>21 inches dbh) roost trees (Barclay and Kurta 2006). For species that avoid foraging in dense forests, bat activity may increase post-fire due to an increased insect

productivity and more open foraging conditions at least for the first year after the fire (Buchalski et al. 2013). During this one year post-fire study, Buchalski et al. (2013) show that bat activity was either neutral or positive regardless of the intensity of the fire.

Bats use of trees and snags includes cavities in hollow trees, cracks or crevices in trees or snags, or behind exfoliating (sloughing) bark. They may be less likely to use heavily charred/sooty fire-killed trees if a sufficient number of roost trees are available in the surrounding area. The 2012 Pole Creek Fire and 2014 Two Bulls fire likely removed some roost habitat while creating additional roost habitat within the Deep Canyon watershed. Removal of dense forest patches may have improved foraging conditions for bats at least short-term, particularly where viable roosting habitats occur within close proximity to water.

Lacki et al. (2012) monitored 301 roost snags of long-legged myotis in Oregon, Washington, and Idaho. This is one of the most common bat species occurring on the Deschutes National Forest. Overall, persistence rates declined with increasing roost-years across study areas. Roost snags in Washington showed a lower persistence rate 1 year post-discovery than did roost snags in Oregon and Idaho. Estimates of percentage of snags still standing 10 years post-discovery were highest for ponderosa pine (6.8%), slightly less for Douglas-fir (5.3%), and lowest for grand fir (0.9%). They found half-lives of roost snags to be <3 roost-years, much shorter than other published values for half-lives of snags of multiple species of conifers (Russell et al. 2006, Angers et al. 2010), and the overall average of roost snag persistence 10 years post-discovery across snag species was 4.3%. Replenishment of snags suitable for long-legged myotis on an annual basis is likely needed to ensure adequate habitat of this bat species, especially given the frequency of roost switching within years shown by many bats (Lewis 1995, Barclay and Kurta 2007) and the short-term reuse of tree roosts among years by bats.

Alternative 1 -No Action (Ecological Trends)

There are no known direct impacts to snags, down wood, or green tree replacements (GTRs) under Alternative 1 (No Action). Current fuel continuity due to increased fuel loadings from the past 100 years of fire suppression has put the project area at risk of large fire. Within the Whychus and Deep Canyon watersheds, there have been 7 large fires since 2002. The Melvin Butte project area is one of the few remaining mid-elevation areas on the Sisters Ranger District that has not burned. Due to the history of the district and small lighting caused fires in or near the project area from 2014 fire season, the likelihood is high for stand replacing fire in this area. These large stand replacement events create snags; however, this pulse of snags is short lived (less than 25 years) and there is a long lag until snags are available on the landscape. In addition, there are limited large trees to provide future large snag habitat. Competition will continue to increase in these overstocked stands and smaller snags are expected to increase across the landscape over time.

Snags are expected to increase over time as insects and disease in overly dense stands continue to cause additional tree mortality at natural levels consistent with increasing levels of inter-tree competition. Down wood levels would be expected to increase as snags continue to fall in the future in the absence of fire. Although a steady recruitment of new snags and logs are expected, they would generally be less than 20" dbh size classes, the preferred size class by many species of wildlife. Green tree replacements would also remain at existing levels across the landscape and all trees would continue to be available for use as green tree replacements.

However, there is also risk of a high-intensity stand replacement fire which may reduce current habitat conditions for a larger number of species. In addition, these pulses of post-fire habitat are usually short-lived. Stand resilience to insects, disease, and wildfire is measured by the Upper Management Zone (UMZ). The UMZ relates to the density of trees (basal area, trees per acre, etc.) a forest stand can support without significant mortality from bark beetles. The upper management zone is the density level at which trees begin to come under significant stress and can become susceptible to bark beetles and other insects

and diseases. Forest stands managed below the upper management zone are more resilient. There are approximately 4,456 acres that have the potential to receive vegetation treatment. Under the existing condition/no action 92% of these stands are above the Upper Management Zone and are at risk or currently be impact by insects, disease and stand replacing fire due to high stand densities and as a result low resiliency.

Extreme fire hazard equates to high flame lengths and varying degrees of crown fire. Given assumptions made from best available science, extreme and even moderate and high fire hazard would be damaging to valued stand characteristics.

As insects and disease increase in these stands large areas of dense snags will increase. As snags fall, roosts will be lost and there will likely be a long period of time before large roosts are available. Loss of stands containing green trees will limit use by some species (e.g., long-legged bat and silver-haired bat) until stands recover. Recovery of forested stands will depend on the presence of conifer seed sources. In many areas, the absence of a seed source will delay recovery by several decades. Where there was a seed source, the majority (80-90%) is comprised of white fir. This is not a tree species usually favored by bats as white fir does not get as large as Douglas-fir or ponderosa pine or develop deep fissured bark used for roosting. However, white-fir does result in hollow snags more often than the other species, which also provides roost habitat. In the event of future impacts to the project area by fire Mixed mortality and underburned stands across the landscape will likely serve as habitat. However, in stands dominated by white fir, these stands will likely see additional impacts over the next 5-10 years as white fir damaged by fire are likely to die due to the thin bark and root system near the surface. This will provide more snag habitat but will also reduce the canopy. Many species use riparian areas which will likely recover more quickly than conifer stands unless fire intensity was at a level to kill the root systems. Bat species that roost in rock crevices, bridges, cliff faces, and buildings are not likely to see any decrease in these types of roost site structure; however, impacts to the vegetation surrounding these sites from the fire may impact suitability.

Direct and Indirect Impacts—Alternative 2 and 3

Large snags are not proposed for removal as part of the treatments under any of the action alternatives. Minor incidental loss of snags may occur during treatments due to OSHA requirements for removal of danger trees during operations; however these are incidental and would occur randomly throughout the project area, not affecting snag patches. Snags ≥ 10 inches dbh that are determined to be safety hazards will be felled and left as down wood.

Lodgepole pine and white-fir snag numbers would be slightly reduced from current levels due to harvesting of standing dead lodgepole pine and white-fir within approximately 249 acres associated with Lodgepole Improvement Harvest (LPI) and approximately 241 acres of Scenic Views Enhancement treatment. Within LPI units, both lodgepole pine and white-fir are either dead or dying due to insects and disease outbreaks. These outbreaks were brought on as a result of stress to individual trees from high stand densities and intraspecific competition for site resources. Treatments will remove dead and dying trees to reduce fuel concentrations around green trees. Stand densities will be reduced, minimizing the likelihood of continued bark beetle outbreaks enhancing the longevity of the residual green trees by removing diseased trees. The Scenic Views Enhancement treatments occur along the 16 road corridor and are associated within lodgepole pine and some mixed conifer. During the Pole Creek Fire, this portion of the 16 road received stand replacing and mixed mortality fire. The road corridor is within the Scenic Views land allocation identified under the Deschutes Land and Resource Management Plan. The objective of this treatments are to enhance the scenic quality of the road corridor by removing concentrations of small diameter fire killed trees retaining all live trees as well as all large snags. Treatments will result in enhanced visual quality along the road corridor while retaining snag habitat providing utility for bats as roosting habitat (LRMP M9-79,80, 81).

Alternatives 2 and 3 propose understory treatments including non-commercial thinning, whip falling, and/or ladder fuel reduction and prescribed burning across all habitat types (ponderosa pine, mixed conifer, and lodgepole pine) and associated with all treatment types. These activities would not directly remove snags in the short-term, but may have some beneficial impacts to these habitat components in the long-term by creating stand conditions that would accelerate and develop larger tree structure and future snags, than if these small trees were not thinned.

In areas identified for thinning, canopies will be opened up and stand densities reduced to lessen the risk of a large-scale event (insects, disease, or fire). Thinning will directly reduce canopy cover, but it will also reduce the fire risk to individual stands by breaking up the fuel continuity across the project area, reducing the continuation of these disturbance events. Under Alternative 2, within MCGO treatments, small group openings will be created from 1 to 3 acres in size where the unhealthy white-fir dominates these stands. These group openings will be planted to ponderosa pine to increase the stands resilience to insects, disease and fire. In the short-term, due to the removal of unhealthy white-fir, there will be lower recruitment of white-fir snags in these areas but treatments will retain all healthy white-fir and ponderosa pine promoting vigor and accelerating the development of large tree structure throughout these stands. As a result, larger snags will be recruited in the long-term, which have the potential to be utilized by bats.

In addition, removal of understory in overstocked stands will decrease the competition for nutrients and water, which is anticipated to lower the susceptibility of the trees to insects and disease (Cochran and Barret 1999). Currently there are a limited number of large snags and trees available as well as replacement large trees. Many of the future large trees and snags are within overstocked stands, which will increase the amount of time the trees will take to get to the desired size and height. Thinning overstocked stands will reduce competition which should increase growth rates to the remaining trees. Cochran and Barret (1999) showed that 30 years after thinning on the Deschutes National Forest there were large differences in average tree sizes among different group stocking levels. They also showed that the growth rates of the 20 largest diameter trees per acre were reduced by competition from smaller trees.

Fuels treatments in the project area will break up the fuel continuity and reduce the risk of a large fire event, which should reduce the risk to individual large snags and trees. Effects to snags from prescribed underburning are similar for both alternatives with similar acres proposed under Alternative 2 and 3 (933 acres). Mortality of snags in ponderosa pine habitat during prescribed fire treatments in Arizona and California ranged from 20% (Randall-Parker and Miller 2002), 45% (Horton and Mannan 1988), and 56% (Bagne et al. 2008). All three studies found that larger diameter ponderosa pine trees were least likely to die, at least in the short-term. Horton and Mannan (1988) found a 20-fold increase in abundance of snags < 15 cm dbh and showed evidence of woodpecker foraging use in southeastern Arizona. Several studies showed that the highest snag losses were in areas where a long period of fire exclusion had occurred (Bagne et al. 1988, Holden et al. 2006). Bagne et al. (2008) and Horton and Mannan (1988) found that re-entry burns had a much lower mortality rate for snags, presumably because the trees that did not burn during the first entry were more resilient. Loss of snags from prescribed fire was partially mitigated by the creation of new snags (Horton and Mannan 1988, Bagne et al. 2008). Therefore it is anticipated that although some existing bat habitat may be lost for prescribed fire activity, new snags will be produced from fuels treatments in the short-term. However, newly created snags will remain unsuitable until they decay to the point of providing viable roosting habitat.

Approximately 775 acres of the project area will remain as untreated stands, retaining high stocking densities providing habitat for interior forest species. These denser (untreated) forest patches will act as part of the greater landscape mosaic. These areas will have a higher stocking rate and will provide some diversity of canopy cover across the landscape and in the short-term will recruit existing large trees as snags providing bat roosting habitat in the short-term

In untreated habitat there will continue to be an increased risk from disturbance, although breaking up the fuel continuity across the landscape will reduce the risk larger scale disturbance events. In addition, some

of the areas identified for no treatment occur within higher site potential areas, which allow them to produce large trees with greater canopy closure. These areas will continue to provide large green tree structure with areas of higher snag densities intermixed.

See snag and log analysis for a complete summary on affects to snag habitat.

Cumulative Impacts—Alternatives 2 and 3

The cumulative effects area for bats includes both the Whychus and the Deep Canyon watersheds due to stand replacing fires that are associated with both watersheds and overlap the Melvin Butte project area. Previous effects to potential bat habitat include loss of large-diameter trees and snags due to timber harvest, reduction in large-tree structure due to overstocked stands, and fires. The Black Crater, Pole Creek, and Two Bulls Fires created roost habitat particularly in the mixed mortality areas and in some of the stand-replacing burned areas. Foraging habitat in previously dense contiguous large patches may have been enhanced in these fires due to openings in the mid-canopies.

Approximately 54 acres of salvage logging are ongoing within the Pole Creek Fire and approximately 250 acres of salvage logging is being proposed within the Two Bulls Fire. Danger tree removal has occurred or will occur on these fires to varying degrees resulting in a reduction of potential roost sites in stand replacement areas along main roads.

Activities proposed under the Sisters Area Fuels Reduction (SAFR) project, Glaze Forest Restoration project, Ursus Hazardous Fuels Reduction project, Bend Municipal Watershed Fuels Reduction project, and Bear Wallow Fire Wood project have occurred or will occur in the two watersheds. Fuels reduction treatments focus on removing dead lodgepole pine among green stands to reduce fuel loading. The SAFR and Glaze projects all focus on thinning from below to restore and enhance ponderosa pine conifer stands while reducing the risk of stand replacing fires. Overall, treatments proposed could reduce snag and log habitat, but primarily focus on thinning from below to reduce fuel densities on approximately 21,507 acres. These projects are being implemented to reduce the risk of loss of existing habitat from future large-scale disturbances.

Potential roost sites are not limited in the watershed outside the project area due to the mosaic of varying degrees of fire severities. In portions of the watersheds, treatments and natural fires enhanced foraging habitat by opening up mid-canopies while in other areas, a reduction in shrub habitat may reduce habitat for insect prey. Fires across the watersheds have resulted in a reduction of large snags.

The proposed thin, mow, and burn treatments in Ursus vegetation management projects would accelerate the development of large tree structure which would provide positive benefits for bat roost habitat long-term (i.e., greater than 30 years post-implementation).

Personal use firewood cutting is occuring within the 3,029 acre Three Creek's Firewood Cutting area. Individual dead trees are being removed by personal use firewood cutters primarily within the road prism of open roads. Cutting is not wide spread and occurs on a site specific basis, where individual trees are removed or small groups of dead trees. Only dead lodgepole pine and white-fir can be taken for firewood.

Alternatives 2 and 3 would not incrementally add to ongoing and reasonably foreseeable impacts to bats, the Melvin Butte project does not propose to remove large snags that provide habitat.

Conclusion—Alternatives 2 and 3

Cumulatively under Alternative 2 and 3 no snags are targeted for removal. Incidental removal will occur where fuels loading and overall stem density reduction is occurring around healthy stands of trees. Targeted tree removal in these areas will be trees that are fading from residual bark beetle out breaks and disease issue. This treatment will occur on approximately 249 acres under Alternative 2 and approximately 445 under Alternative 3. The Whychus and Deep Canyon Watershed has been highly impacted by wildfire, high snag densities currently exist within these watersheds. Over time within these post fire areas, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment limiting roosting habitat for bat habitat. Dahms (1949) found 10 years post-fire, 50% of fire killed ponderosa pine snags remained standing but this declined to 22% standing after 22 years. It is estimated that about 75% of all snags may fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). Treatments proposed for Melvin Butte will promote the development Late and Old structure and reduce the risk of continued wildfire to these watersheds, promoting roosting habitat for bat over-time. The Melvin Butte project will retain fully stocked stands to recruit snags individually over time. With the ongoing forest management projects within the Whychus and Deep Canyon Watersheds there will be less than a 1% reduction in overall snag habitat. Implementation of this project will not incrementally contribute to a change in viability of bat habitat on the Deschutes National Forest.

Mitigation Measures: See snag and down wood

Recommendations: See snag and down wood

Appendix 1. Management Indicator Species.

Management Indicator Species from the Deschutes LRMP Species	Scientific Name
Northern Goshawk	*Accipiter gentiles*
Coopers Hawk	*Accipiter cooperii*
Sharp-shinned Hawk	*Accipiter striatus*
Golden Eagle	*Aquila chrysaetos*
Great Gray Owl	*Strix nebulosa*
Great Blue Heron	*Ardea herodias*
Red-tailed Hawk	*Buteo jamaicensis*
Osprey	*Pandion haliaetus*
Elk	*Cervus elephas*
Mule Deer	*Odocoileus hemionus*
American Marten	*Martes americana*
Western Big-eared Bat (Townsend's)	*Plecotus townsendii*
Woodpeckers (MIS)	
Black-backed Woodpecker	*Picoides arctus*
Hairy Woodpecker	*Picoides villosus*
Lewis' Woodpecker	*Melanerpes lewis*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Pymy Nuthatch	*Sitta pygmaea*
White-headed Woodpecker	*Picoides albolarvatus*
Waterfowl (MIS)	
Canada Goose	*Branta canadensis*
Wood Duck	*Aix sponsa*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
American Wigeon	*Anas Americana*
Canvasback	*Aythya valisineria*
Redhead	*Aythya Americana*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Green-winged Teal	*Anas carolinensis*
Ring-necked Duck	*Aythya collaris*
Barrow's Goldeneye	*Bucephala islandica*

Appendix 2. Birds of Conservation Concern [BCR 9 (Great Basin) BCC 2008 list]

Bird Species	Preferred Habitat	Habitat within the Melvin Butte Project Area (Y or N)
Swainson's Hawk	Open lands with scattered trees	No
Ferruginous Hawk	Elevated Nest Sites in Open Country	No
Golden Eagle	Elevated Nest Sites in Open Country	No
Peregrine Falcon	Cliffs	No
Prairie Falcon	Cliffs in open country	No
Greater Sage Grouse	Sagebrush dominated Rangelands	No
Yellow Rail	Dense Marsh Habitat	No
American Golden-Plover	Burned Meadows/Mudflats	No
Snowy Plover	Dry Sandy Beaches	No
American Avocet	Wet Meadows	No
Solitary Sandpiper	Meadow/Marsh	No
Whimbrel	Marsh/Mudflats	No
Long-billed Curlew	Meadow/Marsh	No
Marbled Godwit	Marsh/Wet Meadows	No
Sanderling	Sandbars and beaches	No
Wilson's Phalarope	Meadow/Marsh	No
Yellow-billed Cuckoo	Dense riparian/cottonwoods	No
Flammulated Owl	Ponderosa pine forests	Yes
Burrowing Owl	Non-forested Grasslands	No
Black Swift	Cliffs associated with waterfalls	No
Lewis's Woodpecker	Ponderosa pine forests	Yes
Williamson's Sapsucker	Ponderosa pine forests	Yes
White-headed Woodpecker	Ponderosa pine forests	Yes
Loggerhead Shrike	Open country with scattered trees or shrubs	No
Gray Vireo	Arid scrub habitat	No
Virginia's Warbler	Scrubby vegetation within arid montane woodlands	No
Brewer's Sparrow	Sagebrush clearings in coniferous forests/bitterbrush	No
Sage Sparrow	Sagebrush	No
Tricolored Blackbird	Cattails or Tules	No

Appendix 3. Landbird Strategic Plan

Priority habitat features and associated focal species for Central Oregon.

Habitat	Habitat Feature	Focal Species for Central Oregon
Ponderosa Pine	Large patches of old forest with large snags	White-headed woodpecker
	Large trees	Pygmy nuthatch
	Open understory with regenerating pines	Chipping sparrow
	Patches of burned old forest	Lewis' woodpecker
Mixed Conifer (Late-Successional)	Large trees	Brown creeper
	Large snags	Williamson's sapsucker
	Interspersion grassy openings and dense thickets	Flammulated owl
	Multi-layered/dense canopy	Hermit thrush
	Edges and openings created by wildfire	Olive-sided flycatcher
Lodgepole Pine	Old growth	Black-backed woodpecker
Meadows	Wet/dry	Sandhill Crane
Aspen	Large trees with regeneration	Red-naped sapsucker
Subalpine fir	Patchy presence	Blue grouse

Appendix 4. GNN Modeling, DecAID Analysis for the Whychus and Deep Canyon Watersheds

The purpose of this analysis was to provide an estimate of small (10-20 inches dbh) and large (20 inches dbh and greater) diameter snags in both the Whychus Creek and Deep Canyon watersheds within both green stands as well as post fire habitat that containing stand-replacement, mixed severity, and underburned areas on National Forest lands. The effects of removing dead wood habitat on approximately 240 acres of the Scenic Views Allocation within the mixed-conifer were also evaluated.

Assumptions/Limitations of Analysis

1. Analysis considered stand-replacement, mixed, and underburned severities.
2. Given the short time since the fire, substantial fall-down of snags was assumed not to have occurred.
3. The minimum size class for the GNN analysis was 10"dbh, therefore plantation in most cases were not include in the analysis due to the fact that the majority of the trees associated with plantations are less than 10"dbh.

All vegetation mortality for this analysis utilized the Burn Intensity GIS layer that was created during the Pole Creek Fire Burned Area Emergency Response (BAER). The soils report from the BAER categorized the burn intensity to vegetation mortality. Table 1 has the cross walk that the Soils report outlines.

Table 1. Burn Intensity to Vegetation Mortality for Post Fire areas.

Burn Intensity	Vegetation Mortality Class	Percent Mortality
High	Stand Replacement	100%
Moderate	Stand Replacement	75 to 100%
Low	Mixed Severity	25 to 75%
Underburned / Unburned	Underburned / Unburned	< 25%

Gradient Nearest Neighbor (GNN) Modeling

GNN maps consist of 30 meter pixel (grid) maps with associated data (tree size, density, snag density, canopy cover, percent down wood cover, etc.). The maps used for this analysis were developed by the Landscape Ecology, Modeling, Mapping, and Analysis (LEMMA) team as part of the GNNPAC Pacific States Forest Vegetation Mapping project. This project involves developing detailed maps of existing forest vegetation across all land ownerships in the Pacific Coast States (Oregon, Washington, and parts of California). It is being conducted by the LEMMA team (Pacific Northwest Research Station (PNW) and Oregon State University) at the Corvallis Lab, in close collaboration with the Western Wildlands Environmental Threats Assessment Center, the Interagency Mapping and Assessment Project (IMAP), Northwest Forest Plan Effectiveness Monitoring, the Remote Sensing Applications Center, and Forest Inventory and Analysis at the PNW Research Station.

The process to create the maps involves using gradient imputation (Gradient Nearest Neighbor, or GNN). GNN uses many variables on a gradient along with satellite imagery to assign data from known field plots to pixels with no data that have the same satellite imagery signature (i.e. it "looks" the same to the computer). The species-size GNN model was used in the Pole Creek Fire analysis. This model

uses species composition and stand structure as components for developing maps. Accuracy of the modeling depends on how "like" pixels match up based on numerous variables. Generally speaking, forest types that had more samples like white-fir were more accurate than those with fewer samples like mountain mahogany (Ohman et al. 2008). Information on GNN accuracy, the LEMMA group, IMAP and the GNNPac project is available at the project website: http://www.fsl.orst.edu/lemma/gnnpac.

To determine snags densities from the GNN data, pre-fire stand structure and composition data was used and associated with the vegetation mortality mapping for post fire areas. Once vegetation mortality was applied GNN stand structure and composition data could estimate snag numbers in areas containing both post fire snag numbers and sizes on all acres of stand replacement, mixed severity, underburned stands.

In areas where post fire salvage occurred, snag densities were reduced to the residual density of the proposed action for those project areas.

DecAID Analysis

Use of DecAID Wildlife Data

The wildlife data in DecAID is provided in the form of tolerance levels of 30 percent, 50 percent, or 80 percent. A **tolerance interval** is similar to a confidence interval but with a key difference: tolerance intervals are estimates of the percent of all *individuals* in the population that are within some specified range of values. In the DecAid Advisor tolerance *levels* are used. Levels are one-sided intervals with the lower limit of the interval being zero. Thus, an 80% tolerance level indicates 80% of the individuals in the population have a value for the parameter of interest between 0 and the value for the 80% tolerance level. Or conversely, 20% of the individuals in the population have a value for the parameter of interest greater than the 80% level.

DecAID tolerance levels "may be interpreted as three levels of "assurance": low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level)" (Mellen et al. 2006). The higher the tolerance level, the higher the "assurance" that snag habitat is being provided.

Referring to the array of wildlife data collected (for all habitats, not just post-fire habitats) DecAid notes: "The wildlife studies, on which the wildlife portion of DecAID is based, were conducted in a variety of landscapes and site conditions. Typically, the studies (a) did not report how the general study areas and specific study sites were chosen relative to others, and (b) did not describe how the vegetation conditions within the general study areas and specific study sites differed from conditions within a broader area, especially within the wildlife habitat and vegetation condition classes used in DecAID. Thus, there is no way to know to what degree the study areas and sites varied from conditions generally present, and thus no way to gauge the bias in study area and site selection. In turn, this means there is no way to estimate the degree of bias in the wildlife data summarized in DecAID (Mellen et al. 2006)".

DecAID goes on to suggest that this unknown bias can be reduced to acceptable levels by either 1) examining the underlying data and evaluate whether the component studies either pertain to their

locations or vegetation conditions of interest, or 2) by determining if the number and breadth of studies may adequately capture the range of conditions within a wildlife habitat and structural condition.

Therefore, it is important to consider how plant communities and conditions at the local site differ from plant communities and conditions in the studies used in DecAID. The primary study used to assess wildlife use of post-fire habitat was Saab and Dudley (1998). These data are from habitat fairly similar to post fire conditions found in the Whychus and Deep Canyon Watershed areas. However, there were more areas of very high snag density in the Saab and Dudley (1998) study than found in Whychus and Deep Canyon Watersheds. For other habitat types, the underlying study information was considered appropriate except where noted in the discussion of effects.

DecAID was used to assist with the analysis of impacts on snag dependent wildlife species. DecAID was used as a:

1. Thorough review of published literature and other available data on wildlife use of decayed wood elements, primarily in Oregon and Washington.
2. Statistical synthesis of data showing levels of use by individual wildlife species of decayed wood elements.
3. Summary of the patterns of use of decayed wood elements by wildlife species in Oregon and Washington (number of species using specific snag or down wood sizes or amounts).
4. Helpful tool for making informed decisions.

DecAID was not used as a:

1. To determine forest stand structure and composition of snags for Whychus and Deep Canyon watersheds.
2. To model snag and down wood recruitment.
3. DecAID was not used to simulate populations or as a viability analysis.
4. Substitute for making professional decisions based on experience.

DecAID Analysis

Using the corporate Plant Association Group layer the following PAGS were put into the following DecAID wildlife habitat types (Table 4). The PAG layer was clipped to the Pole Creek Fire Area.

Table 4. PAGs converted to DecAID Wildlife Habitat Types.

DecAID Wildlife Habitat Type	PAG
Eastside Mixed Conifer**	Mixed Conifer Wet
	Mixed Conifer Dry
	Riparian that occurs within MCW and MCD
Lodgepole	Lodgepole Pine Dry
	Lodgepole Pine Wet
	Riparian that occurs within LPW and LPD
Montane Mixed Conifer Forest	Mountain Hemlock Dry
	White Bark Pine Dry
	Riparian occurring within MHD and WBPD
Ponderosa Pine/Douglas-fir**	Ponderosa Pine Wet
	Ponderosa Pine Dry
	Riparian occurring within PPW and PPD
Non-forest	Alpine Meadow

	Cinder
	Meadow
	Hardwood
	Lava
	Meadow
	Mesic Shrubland
	Rock
	Water

Wildlife data located in DecAID can be utilized by habitat type and structural class. For the Melvin Butte project there are four habitat types: eastside mixed conifer (EMC), lodgepole (LPP), montane mixed conifer (MMC), and ponderosa pine/Douglas-fir (PP). The Melvin Butte project was broken into these four habitat types by utilizing the plant association groups (Table 4). However, the cumulative effects analysis only discussed incremental impact to EMC, LPP, and PP since there are no treatments associated with MMC.

Structural class was broken into two categories. All stand replacement areas were analyzed with the post-fire structural class as outlined by Mellen et al. (2006). All mixed severity, underburned, and unburned areas were analyzed with the small and medium structural class (Table 5).

Stand data for snag numbers (from GNN) were then overlayed to the habitat types and structural classes.

SNAG DEPENDENT SPECIES

DecAID synthesized data from research studies to create cumulative species curves for wildlife use of snags by habitat type and structural condition. From these curves tolerance levels were determined. Tables 5 through 13 are compilations of synthesized data for wildlife use of snag densities from various studies by habitat type and structural condition located in DecAID.

STAND REPLACEMENT FIRE

There is no available wildlife species use data within DecAID for the lodgepole pine habitat type. The GNN modeling only modeled snags 10 inches and greater, due to majority of the project being within EMC and PP habitat types. Very little of the project occurs within the LPP habitat type. Synthesized data for the post fire montane mixed conifer habitat type only has data for snags 3 inches dbh or greater, so post-fire montane mixed conifer was not evaluated. It is assumed that all post-fire lodgepole and montane mixed conifer habitat types will be providing habitat for species. Tables 6-9 are compilations of synthesized data for wildlife use of snags found within DecAID. There are other species identified in DecAID as using various habitat types and structural classes that were not analyzed, as they are not Management Indicator Species on the Deschutes National Forest.

Table 5: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in recent post-fire Eastside Mixed Conifer Forest Wildlife Habitat Type

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)

Black-backed Woodpecker	56.1	81.1	117.6
Hairy Woodpecker	39.2	63.3	100.0
Lewis' Woodpecker	24.8	43.0	71.0
Mountain Bluebird	38.1	63.2	101.4
Northern Flicker	25.0	48.0	83.1
Western Bluebird	28.8	49.8	81.6
White-headed Woodpecker	0.0	40.0	118.4
Data acquired from DecAID Tables EMC_PF.sp-22			

Table 6: Synthesized data for wildlife use of snag densities rom various studies for 20 inch and greater snags in recent post-fire Eastside Mixed Conifer

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Cavity Nesting Birds	NA	8.4	NA
Lewis' Woodpecker	0.0	6.2	16.1
Mountain Bluebird	0.0	12.4	38.0
Northern Flicker	2.2	17.4	39.6
Data acquired from DecAID Tables EMC_PF.sp-22			

Table 7: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in recent post-fire Ponderosa Pine/Douglas fir Forest Wildlife Habitat Type

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	37.4	52.8	76.5
Hairy Woodpecker	39.2	63.3	100.0
Lewis' Woodpecker	24.7	42.7	70.6
Mountain Bluebird	38.1	63.2	101.4
Northern Flicker	25.0	44,9	83.1
Western Bluebird	28.8	49.8	81.6
White-headed Woodpecker	22.2	40.9	68.3
Data acquired from DecAID Tables PPDF_PF.sp-22			

Table 8: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in recent post-fire Ponderosa Pine/Douglas fir Forest Wildlife Habitat Type

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Cavity Nesting Bird	NA	8.4	NA
Lewis' Woodpecker	0.0	6.2	16.1
Mountain Bluebird	0.0	12.4	38.0
Northern Flicker	2.2	17.4	39.6
Data acquired from DecAID Tables PPDF_PF.sp-22			

MIXED SEVERITY, UNDERBURNED, AND UNBURNED

Tables 9 through 15 are compilations of synthesized data for wildlife use of snags found within DecAID.

Table 9: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Eastside Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	11.8	12.8	14.4
Black-backed Woodpecker	2.5	13.6	29.2
Pileated Woodpecker	14.9	30.1	49.3
Pygmy Nuthatch	1.1	5.6	12.1
White-headed Woodpecker	0.3	1.9	4.3
Williamson's Sapsucker	14.0	28.4	49.7
Data acquired from DecAID Table EMC_S/L.sp-22.			

Table 10: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Eastside Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	3.7	4.0	4.5
Black-backed Woodpecker	0.0	1.4	5.7
Cavity Nesting Birds	NA	2.4	NA
Pileated Woodpecker	3.5	7.8	18.4
Pygmy Nuthatch	0.0	1.6	4.0
White-headed Woodpecker	0.0	1.5	3.8
Williamson's Sapsucker	3.3	8.6	16.6
Data acquired from DecAID Table EMC_S/L.sp-22.			

Table 11: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Ponderosa Pine/Douglas Fir Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	2.5	13.6	29.2
Cavity Nesting Birds	1.2	4.7	10.0
Hairy Woodpecker	0.0	17.0	44.4
Pileated Woodpecker	14.9	30.1	49.3
Pygmy Nuthatch	1.1	5.7	12.1
White-headed Woodpecker	0.0	3.9	11.9

Williamson's Sapsucker	14.0	28.4	49.7
Data acquired from DecAID Table PPDF S/L.sp-22.			

Table 12: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Ponderosa Pine/Douglas Fir Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	0.0	1.4	5.7
Cavity Nesting Birds	0.0	1.0	2.8
Pileated Woodpecker	3.5	7.8	18.4
Pygmy Nuthatch	0.0	1.6	4.0
White-headed Woodpecker	0.5	1.8	3.8
Williamson's Sapsucker	3.0	8.4	16.3
Data acquired from DecAID Table PPDF S/L.sp-22.			

Table 13: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Montane Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	3.7	4.0	4.5
Data acquired from DecAID Tables MMC_S/L.sp-22.			

Table 14: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Lodgepole Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	11.8	12.8	14.4
Data acquired from DecAID Tables LP_S.sp-22.			

Table 15: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Lodgepole Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	3.7	4.0	4.5
Data acquired from DecAID Tables LP_S.sp-22.			

For more detailed information about the wildlife data and associated research see the DecAid Advisor www.fs.fed.us/wildecology/decaid/decaid_background/decaid_home.htm

Whychus Creek and Deep Canyon watersheds Wildlife Species Analysis

Using data from GNN and data within DecAID, an analysis was conducted to rate habitat quality for individual species. Since the Melvin Butte project does not propose to remove snags and any reduction is snags will be incidental, there is no measurable difference to snag densities at the watershed level by

alternative. Thus, there the following table displays habitat quality for the watersheds. The following assumptions were used for this analysis.

1. GNN data accurately depicts snags numbers.
2. "It is our fundamental assumption that patterns of species' use and selection of dead wood size and amounts represent behaviors that have adaptive advantage fore the species and that serve to bolster individual fitness" (Mellen et al. 2006).
3. Synthesized data for wildlife use of snag densities from Mellen et al. (2006) represent wildlife use within the Whychus and Deep Canyon watersheds.

GNN acres within the Whychus and Deep Canyon watersheds were stratified for each species depending on habitat type and structural composition. Tables 17 displays estimated acres by quality of habitat for snag dependent species.

Table 16: Comparison of habitat for species that utilize stand replacement, mixed severity, underburned fire and unburned areas.

Species	0-30% Poor Quality	>30-50% Low Quality	>50-80% Moderate Quality	>80% High Quality	Grand Total
American Marten	266,230	28,008	25,988	123,088	443,314
Black Backed Wood Pecker	429,942	149,257	50,378	28,526	658,103
Cavity Nesting Birds	316,492	46,795	7,988	5,662	376,938
Hairy Woodpecker	232,395	142,230	1,410	903	376,938
Pileated Woodpecker	583,976	45,890	14,162	14,075	658,103
Pygmy Nuthatch	375,737	99,878	75,101	107,388	658,103
White-headed Woodpecker	269,801	147,231	60,970	180,100	658,103
Williamson's Sapsucker	582,173	46,110	15,745	14,075	658,103

Appendix XX. GNN Modeling, DecAID Analysis for the Whychus and Deep Canyon Watersheds

The purpose of this analysis was to provide an estimate of small (10-20 inches dbh) and large (20 inches dbh and greater) diameter snags in both the Whychus Creek and Deep Canyon watersheds within both green stands as well as post fire habitat that containing stand-replacement, mixed severity, and underburned areas on National Forest lands. The effects of removing dead wood habitat on approximately 240 acres associated with the Scenic Views Land Allocation within the mixed-conifer were also evaluated.

Assumptions/Limitations of Analysis

4. Analysis considered stand-replacement, mixed, and underburned severities.
5. Given the short time since the fire, substantial fall-down of snags was assumed not to have occurred.
6. The minimum size class for the GNN analysis was 10"dbh, therefore plantation in most cases were not include in the analysis due to the fact that the majority of the trees associated with plantations are less than 10"dbh.

All vegetation mortality for this analysis utilized the Burn Intensity GIS layer that was created during the Pole Creek Fire Burned Area Emergency Response (BAER). The soils report from the BAER categorized the burn intensity to vegetation mortality. Table 1 has the cross walk that the Soils report outlines.

Table 1. Burn Intensity to Vegetation Mortality for Post Fire areas.

Burn Intensity	Vegetation Mortality Class	Percent Mortality
High	Stand Replacement	100%
Moderate	Stand Replacement	75 to 100%
Low	Mixed Severity	25 to 75%
Underburned / Unburned	Underburned / Unburned	< 25%

Gradient Nearest Neighbor (GNN) Modeling

GNN maps consist of 30 meter pixel (grid) maps with associated data (tree size, density, snag density, canopy cover, percent down wood cover, etc.). The maps used for this analysis were developed by the Landscape Ecology, Modeling, Mapping, and Analysis (LEMMA) team as part of the GNNPAC Pacific States Forest Vegetation Mapping project. This project involves developing detailed maps of existing forest vegetation across all land ownerships in the Pacific Coast States (Oregon, Washington, and parts of California). It is being conducted by the LEMMA team (Pacific Northwest Research Station (PNW) and Oregon State University) at the Corvallis Lab, in close collaboration with the Western Wildlands Environmental Threats Assessment Center, the Interagency Mapping and Assessment Project (IMAP), Northwest Forest Plan Effectiveness Monitoring, the Remote Sensing Applications Center, and Forest Inventory and Analysis at the PNW Research Station.

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In areas where post fire salvage occurred, snag densities were reduced to the residual density of the proposed action for those project areas.

DecAID Analysis

Explanation of the DecAID advisory tool and how it was applied to the Melvin Butte

Snag management guidelines were developed for the Melvin Butte Vegetation Management project using a variety of information including scientific literature, standards and guidelines outlined in the Forest Land and Resource Management Plan, the Deschutes NF Wildlife Tree and Log Implementation Strategy, the NWFP, local knowledge of the area, and information contained in the DecAID advisory tool. DecAID is a web-based advisory tool to help managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags and down wood. It is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. DecAID is not a simulation model, it is a compilation of the best available, though imperfect, empirical data on wildlife relationships with dead and decaying wood. "DecAID is not a population viability analysis model. There is more to viability of populations than the dead wood habitat component. DecAID can help managers decide how much, and what sizes, of dead wood to provide for this part of species' habitat needs. It is up to the user to understand the underlying data and determine if the data are appropriate to their local situation and conditions. This is why DecAID was designed to allow the user to drill down into increasingly finer details of the data. The user is urged to carefully read the Summary Narratives which discuss and provide red flags, where appropriate, for the basis of underlying studies" (Mellen et al 2006).

DecAID contains two major data sets which are summarized by wildlife habitat types. The inventory data is composed of statistical summaries of forest inventory data on snags and down wood in unharvested forests and entire landscapes across Oregon and Washington. The wildlife data is derived from a thorough review of published literature and other available data on wildlife use of snags and down wood, primarily in Oregon and Washington. DecAID provides a statistical synthesis of data showing levels of use by individual wildlife species of snags and down wood. **For this analysis the wildlife data will be used.**

DecAID will not be used to analyze snags, but DecAID will be used to evaluate habitat to individual species that utilize snags. **"Forest inventory data are not available for recent post-disturbance habitats** (emphasis added). High snag densities resulting from disturbances are temporary because snag densities decline rapidly as snags fall in the first decade or so after the disturbance. As a result, stands which have recently sustained a stand-replacing disturbance are not well represented in the inventory data in DecAID, even those from unharvested plots; they are an extremely small proportion of the landscape at any one point in time. Plots occurring in areas experiencing recent fire or other stand replacing disturbance likely are included in the inventory data from one of the other three structural condition classes and are likely plots with high levels of down wood (i.e., the right side of the distribution histograms). It was not possible to separate out plots occurring in these disturbed areas. As a result, inventory data are not available for recent post-fire habitats." (Mellen 2006).

Use of DecAID Wildlife Data

The wildlife data in DecAID is provided in the form of tolerance levels of 30 percent, 50 percent, or 80 percent. A **tolerance interval** is similar to a confidence interval but with a key difference: tolerance intervals are estimates of the percent of all *individuals* in the population that are within some specified range of values. In the DecAid Advisor tolerance *levels* are used. Levels are one-sided intervals with the lower limit of the interval being zero. Thus, an 80% tolerance level indicates 80% of the individuals in the population have a value for the parameter of interest between 0 and the value for the 80% tolerance level. Or conversely, 20% of the individuals in the population have a value for the parameter of interest greater than the 80% level.

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2. Statistical synthesis of data showing levels of use by individual wildlife species of decayed wood elements.
3. Summary of the patterns of use of decayed wood elements by wildlife species in Oregon and Washington (number of species using specific snag or down wood sizes or amounts).
4. Helpful tool for making informed decisions.

DecAID was not used as a:

5. To determine forest stand structure and composition of snags for Whychus and Deep Canyon watersheds.
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	Riparian occurring within PPW and PPD
Non-forest	Alpine Meadow
	Cinder
	Meadow
	Hardwood
	Lava
	Meadow

	Mesic Shrubland
	Rock
	Water

Wildlife data located in DecAID can be utilized by habitat type and structural class. For the Melvin Butte project there are four habitat types: eastside mixed conifer (EMC), lodgepole (LPP), montane mixed conifer (MMC), and ponderosa pine/Douglas-fir (PP). The Melvin Butte project was broken into these four habitat types by utilizing the plant association groups (Table 4). However, the cumulative effects analysis only discussed incremental impact to EMC, LPP, and PP since there are no treatments associated with MMC.

Structural class was broken into two categories. All stand replacement areas were analyzed with the post-fire structural class as outlined by Mellen et al. (2006). All mixed severity, underburned, and unburned areas were analyzed with the small and medium structural class (Table 5).

Stand data for snag numbers (from GNN) were then overlayed to the habitat types and structural classes.

SNAG DEPENDENT SPECIES

DecAID synthesized data from research studies to create cumulative species curves for wildlife use of snags by habitat type and structural condition. From these curves tolerance levels were determined. Tables 5 through 13 are compilations of synthesized data for wildlife use of snag densities from various studies by habitat type and structural condition located in DecAID.

STAND REPLACEMENT FIRE

There is no available wildlife species use data within DecAID for the lodgepole pine habitat type. The GNN modeling only modeled snags 10 inches and greater, due to majority of the project being within EMC and PP habitat types. Very little of the project occurs within the LPP habitat type. Synthesized data for the post fire montane mixed conifer habitat type only has data for snags 3 inches dbh or greater, so post-fire montane mixed conifer was not evaluated. It is assumed that all post-fire lodgepole and montane mixed conifer habitat types will be providing habitat for species. Tables 6-9 are compilations of synthesized data for wildlife use of snags found within DecAID. There are other species identified in DecAID as using various habitat types and structural classes that were not analyzed, as they are not Management Indicator Species on the Deschutes National Forest.

Table 5: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in recent post-fire Eastside Mixed Conifer Forest Wildlife Habitat Type

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	56.1	81.1	117.6
Hairy Woodpecker	39.2	63.3	100.0
Lewis' Woodpecker	24.8	43.0	71.0
Mountain Bluebird	38.1	63.2	101.4

Northern Flicker	25.0	48.0	83.1
Western Bluebird	28.8	49.8	81.6
White-headed Woodpecker	0.0	40.0	118.4
Data acquired from DecAID Tables EMC_PF.sp-22			

Table 6: Synthesized data for wildlife use of snag densities rom various studies for 20 inch and greater snags in recent post-fire Eastside Mixed Conifer

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Cavity Nesting Birds	NA	8.4	NA
Lewis' Woodpecker	0.0	6.2	16.1
Mountain Bluebird	0.0	12.4	38.0
Northern Flicker	2.2	17.4	39.6
Data acquired from DecAID Tables EMC_PF.sp-22			

Table 7: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in recent post-fire Ponderosa Pine/Douglas fir Forest Wildlife Habitat Type

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	37.4	52.8	76.5
Hairy Woodpecker	39.2	63.3	100.0
Lewis' Woodpecker	24.7	42.7	70.6
Mountain Bluebird	38.1	63.2	101.4
Northern Flicker	25.0	44,9	83.1
Western Bluebird	28.8	49.8	81.6
White-headed Woodpecker	22.2	40.9	68.3
Data acquired from DecAID Tables PPDF_PF.sp-22			

Table 8: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in recent post-fire Ponderosa Pine/Douglas fir Forest Wildlife Habitat Type

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Cavity Nesting Bird	NA	8.4	NA
Lewis' Woodpecker	0.0	6.2	16.1
Mountain Bluebird	0.0	12.4	38.0
Northern Flicker	2.2	17.4	39.6
Data acquired from DecAID Tables PPDF_PF.sp-22			

MIXED SEVERITY, UNDERBURNED, AND UNBURNED

Tables 9 through 15 are compilations of synthesized data for wildlife use of snags found within DecAID.

Table 9: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Eastside Mixed Conifer Small and Medium Structure Classes.

	30% t.l. Snag Density	50% t.l. Snag Density	80% t.l. Snag Density

Species	(#/acre)	(#/acre)	(#/acre)
American Marten	11.8	12.8	14.4
Black-backed Woodpecker	2.5	13.6	29.2
Pileated Woodpecker	14.9	30.1	49.3
Pygmy Nuthatch	1.1	5.6	12.1
White-headed Woodpecker	0.3	1.9	4.3
Williamson's Sapsucker	14.0	28.4	49.7
Data acquired from DecAID Table EMC_S/L.sp-22.			

Table 10: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Eastside Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	3.7	4.0	4.5
Black-backed Woodpecker	0.0	1.4	5.7
Cavity Nesting Birds	NA	2.4	NA
Pileated Woodpecker	3.5	7.8	18.4
Pygmy Nuthatch	0.0	1.6	4.0
White-headed Woodpecker	0.0	1.5	3.8
Williamson's Sapsucker	3.3	8.6	16.6
Data acquired from DecAID Table EMC_S/L.sp-22.			

Table 11: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Ponderosa Pine/Douglas Fir Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	2.5	13.6	29.2
Cavity Nesting Birds	1.2	4.7	10.0
Hairy Woodpecker	0.0	17.0	44.4
Pileated Woodpecker	14.9	30.1	49.3
Pygmy Nuthatch	1.1	5.7	12.1
White-headed Woodpecker	0.0	3.9	11.9
Williamson's Sapsucker	14.0	28.4	49.7
Data acquired from DecAID Table PPDF S/L.sp-22.			

Table 12: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Ponderosa Pine/Douglas Fir Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
Black-backed Woodpecker	0.0	1.4	5.7
Cavity Nesting Birds	0.0	1.0	2.8
Pileated Woodpecker	3.5	7.8	18.4

Pygmy Nuthatch	0.0	1.6	4.0
White-headed Woodpecker	0.5	1.8	3.8
Williamson's Sapsucker	3.0	8.4	16.3
Data acquired from DecAID Table PPDF S/L.sp-22.			

Table 13: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Montane Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	3.7	4.0	4.5
Data acquired from DecAID Tables MMC_S/L.sp-22.			

Table 14: Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Lodgepole Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	11.8	12.8	14.4
Data acquired from DecAID Tables LP_S.sp-22.			

Table 15: Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Lodgepole Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	50% t.l. Snag Density (#/acre)	80% t.l. Snag Density (#/acre)
American Marten	3.7	4.0	4.5
Data acquired from DecAID Tables LP_S.sp-22.			

For more detailed information about the wildlife data and associated research see the DecAid Advisor www.fs.fed.us/wildecology/decaid/decaid_background/decaid_home.htm

Whychus Creek and Deep Canyon watersheds Wildlife Species Analysis

Using data from GNN and data within DecAID, an analysis was conducted to rate habitat quality for individual species. Since the Melvin Butte project does not propose to remove snags and any reduction is snags will be incidental, there is no measurable difference to snag densities at the watershed level by alternative. Thus, there the following table displays habitat quality for the watersheds. The following assumptions were used for this analysis.

4. GNN data accurately depicts snags numbers.
5. "It is our fundamental assumption that patterns of species' use and selection of dead wood size and amounts represent behaviors that have adaptive advantage fore the species and that serve to bolster individual fitness" (Mellen et al. 2006).
6. Synthesized data for wildlife use of snag densities from Mellen et al. (2006) represent wildlife use within the Whychus and Deep Canyon watersheds.

GNN acres within the Whychus and Deep Canyon watersheds were stratified for each species depending on habitat type and structural composition. Tables 17 displays estimated acres by quality of habitat for snag dependent species.

Table 16: Comparison of habitat for species that utilize stand replacement, mixed severity, underburned fire and unburned areas.

Species	0-30% Poor Quality	>30-50% Low Quality	>50-80% Moderate Quality	>80% High Quality	Grand Total
American Marten	266,230	28,008	25,988	123,088	443,314
Black Backed Wood Pecker	429,942	149,257	50,378	28,526	658,103
Cavity Nesting Birds	316,492	46,795	7,988	5,662	376,938
Hairy Woodpecker	232,395	142,230	1,410	903	376,938
Pileated Woodpecker	583,976	45,890	14,162	14,075	658,103
Pygmy Nuthatch	375,737	99,878	75,101	107,388	658,103
White-headed Woodpecker	269,801	147,231	60,970	180,100	658,103
Williamson's Sapsucker	582,173	46,110	15,745	14,075	658,103